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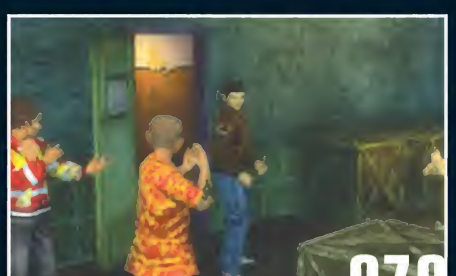

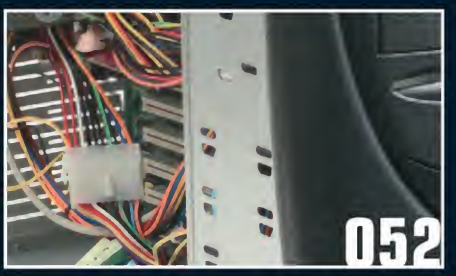

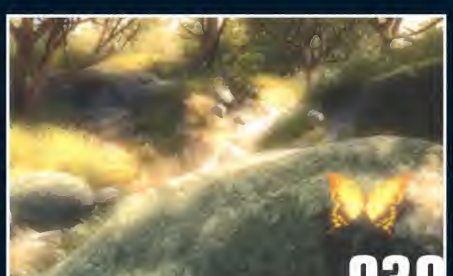

Death of the joystick

Once synonymous with computer gaming, once available in dozens of shapezoids from as many companies, the ubiquitous joystick is now but a flaccid shadow of its formerly proud standing.

Joystickology climaxed gloriously with the Thrustmaster FCS and WCS. The FCS was modelled after the stick used in the F-4 Phantom – a fact boasted by those who used one, predominantly with Falcon 3.0. Here was fully immersive, 3D gaming using a control system, which we could easily convince ourselves to be of the right military stuff.

Gaming had stridden generations! From wiggling a shiny wee knob in the arcade table-tops, to pulling more than just Gs as we carpet-bombed threatening grey polygons into an orange bitmap of explosive triumph.

And the joystick did most of our dirty work.

The mouse was indispensable for navigating around the game's menu, and was a nice and lazy way of playing those nice and lazy turn-based strategy games.

Mousing, too, was essential for playing adventure games, where every pixel on the screen would have to be overflown by the cursor in the hope it would morph from an arrow into a hand so Roger bloody Wilco could find the opening to the bloody trash compactor.

Then the change began.

Gaming was evolving and it wasn't about to take the joystick along with it. Strategy games became real time and the mouse was the only way to play this suddenly dominant genre. Proper steering wheels appeared for driving games and adventure games were saying a sad 'sierra-later'.

Most people around that time, though, were playing Doom. And with but a humble keyboard. Quake was next, and became the cement boots for the joystick and the games that needed it. Some, like brave Logitech, did try to flog a joystick as the 'ultimate Quake weapon', according to my bitch, John Romero, but it was funnier than it was functional.

Flight sims were a dying genre. The commercial sim scene kept the middleweight to hardcore joystick co's in business, such as CH and the venerable Thrustmaster, but combat sims were falling off the horizon fast – Andy Holland's F-15 and Apache series being the last of the grand old originals. EAW reprised the genre briefly, and Falcon 4.0 – the DNF of its day – was taken up only by those purists who had invested in the outrageous $400 Thrustmaster F-16 FLCS stick.

Space combat sims kept the dust off our sticks for a while, along with those ambitious enough to play Descent with a stick-mouse combo – same for those of you who played Forsaken. You know who you are.

A beta for Freelancer recently arrived at *Atomic*.

The foundations for this epic space combat sim/game were layed down by Wing Commander Chris Roberts, but Microsoft ended up finishing the job, after Roberts elected to concentrate on his film-directing career. We're told. . .

Nice game. Frantic space combat action with powerfully-engined and armed craft spiraling in a ballet of dog fighting. The sort of action one can easily associate with young Master Skywalker, as we live our starpilot fantasies of throwing our craft around.

Using a joystick? Nope. Freelancer is controlled entirely by mouse. There's simply no option for joystick support. And there's no need. The mouse control works beautifully. It's so well designed that you really wouldn't want a joystick. Never mind that there's no invert option for the mouse, the interface is joyless and wonderful.

The joystick won't die. It will be with us as long as there are jet fighter planes that go zoom and boys and girl who like to dream. But as an icon of gaming? Get a grip. . .

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Short Circuits

As its Envy24HT sound controller starts to appear on the market, VIA is looking to spearhead a new 24-bit sound standard, which will likely replace AC '97. The company's 'True24 Initiative' marks the progression of its audio product range. Yes, VIA has done its groundwork: it acquired audio company ICEnsemble and already has three studio-level solutions on the market.

Fresh after acquiring legendary game developer Rare, Microsoft may have its sights set on the game-publishing section of Vivendi Universal. The company has a huge number of high-profile developers under its belt, including Blizzard and Sierra. If sold, the section could go for US$15 billion. Microsoft may look to release some Vivendi titles on the Xbox, but the more serious ramifications of the consolidation aren't clear.

SiS has whipped the cloth off a new chipset: the 746FX. Ignoring the less-than-surreptitious link to a certain video card, the chip will support 1GB/s transfer rates, thanks to a new technology developed by SiS called MuTIOL®1G. We don't know how it all works yet, but it will fully support the new Athlon XP core – the Barton – when it comes out, along with AGP 8x.

Value your legs? Then don't sit 18-hour stretches at your PC. A guy in New Zealand suffered blood clots (Thrombosis, like the aeroplanes) while enjoying the fruits of his computer. Carpal tunnel syndrome; RSI; Tennis elbow; and now Thrombosis. Our advice? Make sure you take a break every two or so hours.

artomic

Atomicans are a talented bunch. Just take a look at the amazing support and knowledge on display in the *Atomic* forums.

We want to showcase some of the talent of our artistically-minded readers, so we're opening up the two illustration pages at the beginning of the Hardware and Game review sections for you to display the finest original Atomic-themed artwork your twisted artistic minds can create.

We don't care how you do it: a Photoshop jobbie, a 3D render, a photograph, heck even a hand-drawn sketch. We're sure to get a load of entries each month, and the best of these will be selected for publication. It can be humorous, it can be serious, it can be downright unintelligible (aka abstract) – just so long as it looks amazing and captures the feel of the section it's attached to. In return, your artwork will be seen by up to six billion people, not including extra-terrestrial entities. And can you imagine how good something like this will look on your resume?

Each month, the two winners (one for *Games* and the other *Hardware*) will receive over $2,000 worth of design software, thanks to the incredibly generous people at Adobe (www.adobe.com.au).

The biggie is Adobe InDesign 2.0, worth $1,799, as well as a full version of Adobe Acrobat 5.05, valued at $549. Adobe will give you a choice of the PC or Mac versions.

If you feel you have what it takes, send a preview of your image to artomic@atomicmpc.com.au, no larger than 5MB. Feel free to send us it to us on CD. If it's a lovely enough image, we'll be in touch to arrange delivery of a print quality version of your piece via FTP or CD, which must be a 300dpi, A4-sized CMYK image in TIF format. We'll also need 75 words about what tools you used to create this image and the process used, to be printed alongside each image as we credit your genius. If you don't design, but know people who do, let them know, as we're sure they'll appreciate $2K worth of premium software, not to mention nationwide exposure in a commercial magazine. Please refer to competition terms and conditions on *page 94* for all the legal tomfoolery.

#atomicmpc: chatty chatty bangbang

The Atomic IRC channel (#atomicmpc on Austnet) is the place where us Atomicans can get together and let it all hang out in realtime, without actually having to get motivated enough to leave the comfort and security of our computing dens. For almost two years, this channel has been *the* spawning place for plans of global domination involving mutant gerbils; ideas for bizarre computer mods that will probably end in the electrocution of some innocent teenager and; most importantly, a one-stop shop for PC hardware advice. It also happens to be a great place to just 'shoot the shit', as the young 'uns would say.

This channel is set for a shake up, thanks to the creative inspiration that Gramyre has in abundance, who put forward some clever ideas to improve the overall excellentness of the channel.

You can look forward to the following developments over the coming months:

1. Monthly staff sessions: Head to the IRC channel on the first Tuesday of every month at 8pm to have a chat with the *Atomic* editorial team, who will be ready and waiting to help you out in whatever way we can. You can even be nice to us, if you're one of those do-gooder types.

2. nOObs Tuesday: We were all nOObs once, but unfortunately we didn't have access to the wealth of information that's going to be available every Tuesday night at 8pm in the *Atomic* channel. No matter how naïve or ill-informed your questions may be, you can be sure to get a polite answer without attracting the scorn of those who think they know better.

3. Monthly mag post-mortem: Feedback baby, feedback. Without it *Atomic* would end up like one of those dumb-arsed woolly mammoths who strayed too close to an enticing tar pit – dead and smelly. Every second Tuesday of each month at 8pm we'll have a dedicated feedback chat, so you can tell us what you liked and disliked about the most recent issue of *Atomic*, thus helping *Atomic* to continue to develop into the mag you want it to be.

As you can see, the *Atomic* IRC channel is about to get a whole lot better. Open that Outlook calendar now and enter these important dates, lest you miss out on these unmissable events.

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Short Circuits

Music companies have been trying to pin the blame for file sharing on ISPs for a while now, and it comes as no surprise that Australia is being pushed into an agreement by US trade negotiators that would require ISPs to monitor user downloads. The US industry representatives want their Australian counterparts to lobby for an update of Australian Copyright Act in line with the Digital Millennium Copyright Act, which would make ISPs responsible for the illegal transmission of copyrighted material. So much for those unlimited ADSL plans we mentioned a few issues ago.

Hope you're not running any P2P software. Actually, we hope that you *have never run* any P2P software. According to the US NET (No Electronic Theft) Act 1997, if you've downloaded more than US$1,000-worth of duplicated copyrighted material at any time since the Act passed, you could be looking at a year in prison. This includes those who've already uninstalled all their P2P software and haven't shared a file in yonks. Yeah, that's right: *yonks*.

Our HSF roundup from *issue 23* caused a stir in the *Atomic* forums. It turns out HSFs that use a proprietary mounting mechanism weren't making proper contact with Chernobyl's CPU replica, so the temperatures for the Swiftech and Alpha coolers came out hotter than expected. Never fear, for we have tweaked Chernobyl to work correctly with these coolers – expect new reviews of these products in *issue 27*. All other test results are still accurate and applicable.

Fallout

Way back in January 2001, the first issue of *Atomic* hit the shelves, and alongside it was a little Website and some hand-coded forums. Little did anyone suspect, but the *Atomic* forums were set to spout strange lifeforms know as Atomicans, a bunch of diverse people united through a common interest.

On the anniversary of this event, the Atomican community threw themselves a birthday party, dubbed Fallout. Taking place at a hall in the Sydney suburb of Sylvania, it was part party, part picnic, part LAN and totally a heck of a lotta fun for everyone involved.

Kicking off on Friday night with the cutting of a birthday cake that was half baked-goods, half-luminescent green icing, the event just kept building, with vanloads of eager Atomicans turning up with the aim of putting names to faces, and maybe settle a few old forums debates on the deathmatch servers.

After a night of trivia and icing sugar-induced craziness, Saturday marked the beginning of the LANing. While the hall echoed with the cries of gaming delight, the rest braved one of the hottest days of summer and ran themselves silly playing soccer and football, eating, frolicking and lobbing bits of hardware into a box hoping to win the highly valued title of FrisbeeMark champion.

By Sunday the sleep deprivation was kicking in and the day was winding down towards the return to normal life, which occurred after a short stop off by the organisers to donate $830 each from the money raised at the event to the MS Society and the Canberra Bushfire Appeal.

Everything Fallout was done by the community and for the community, and after countless hours of toil and sacrifice by the organising Atomicans, Fallout was not only a great success it typified just how fantastic a group of people can be found lurking on the *Atomic* forums.

atomican

This month rides on a month of many birthdays. This column marks 12 months Atomican has been in effect, endeavouring to provide as much information as possible for the *Atomic* community, and highlighting a the best of the funny, interesting, and downright stupid posts in the forums. It's just part of the symbiotic existence that is *Atomic*. Without the magazine we wouldn't have the Atomican community, and without the community *Atomic* would be just another mag.

Last month was also the occasion where our magazine reached its second birthday. This was celebrated at the most fantastic event Atomican Fallout, organised by Atomicans, for Atomicans. Events kicked off on the Friday afternoon, and continued just about continuously up until Sunday evening, with much LANing, Frisbee-ing and alcomoholing to be had.

With Atomicans travelling to the event from all over the globe (well Brisbane, Canberra and Melbourne anyway) Fallout was undeniably a phenomenal success from the start. Stay tuned for Fallout V2 in the Community Section of the site.

Speaking of V2, by the time you read this, we will all be mucking around on the new V2 of our beloved site and forums. Thanks to 'Evil Admin and Friends' we'll be able to play with new code, a new server, new users, and new moderator powers (queue maniacal laughter). The site should be a much better experience for all involved.

People are so excited about V2, that with trev99's inspiration (www.atomicmpc.com.au/forums.asp?s=1&c=1&t=2004), the V2-themed avatars have been coming thick and fast. That said, it's only a matter of time until we start wanting V3 – Atomicans being Atomicans.

On an unrelated thread, Dark Lord, being the root of all evil that he is, has provided us with an avenue to list our grievances with the Official Atomican Hate List (www.atomicmpc.com.au/forums.asp?s=1&c=1&t=3075).

It seems that Atomicans hate just about everything from George 'Let's Ignore the UN' Bush, to Britney 'Strangled Cat' Spears. I personally think that it's all just a plot to get Vigo the Mighty (see *Ghostbusters 2*) more power.

So 'till next month folks, remember that rubbing the bathroom door while a person is being sick inside will not make them feel any better, no matter how drunk you or they are.

Wilkshake

WHAT'S HOT

- **Xbox Live – Easy online gaming for the masses**
- **Vapochill – Sub zero computing**
- **C1 Stepping P4 – The overclocker's choice**
- **Impossible Mission – Stay a while, Stay forever!**
- **e7205 chipset – King of the P4 chipsets**

WHAT'S NOT

- **Dreamcast Online – Great idea, no games**
- **Vaporub – The wrong kind of thermal paste**
- **Northwood A P4 – Newly retired champion**
- **Impossible Creatures – Stay a while, move on...**
- **SiS655 – Not regicidal enough for us**

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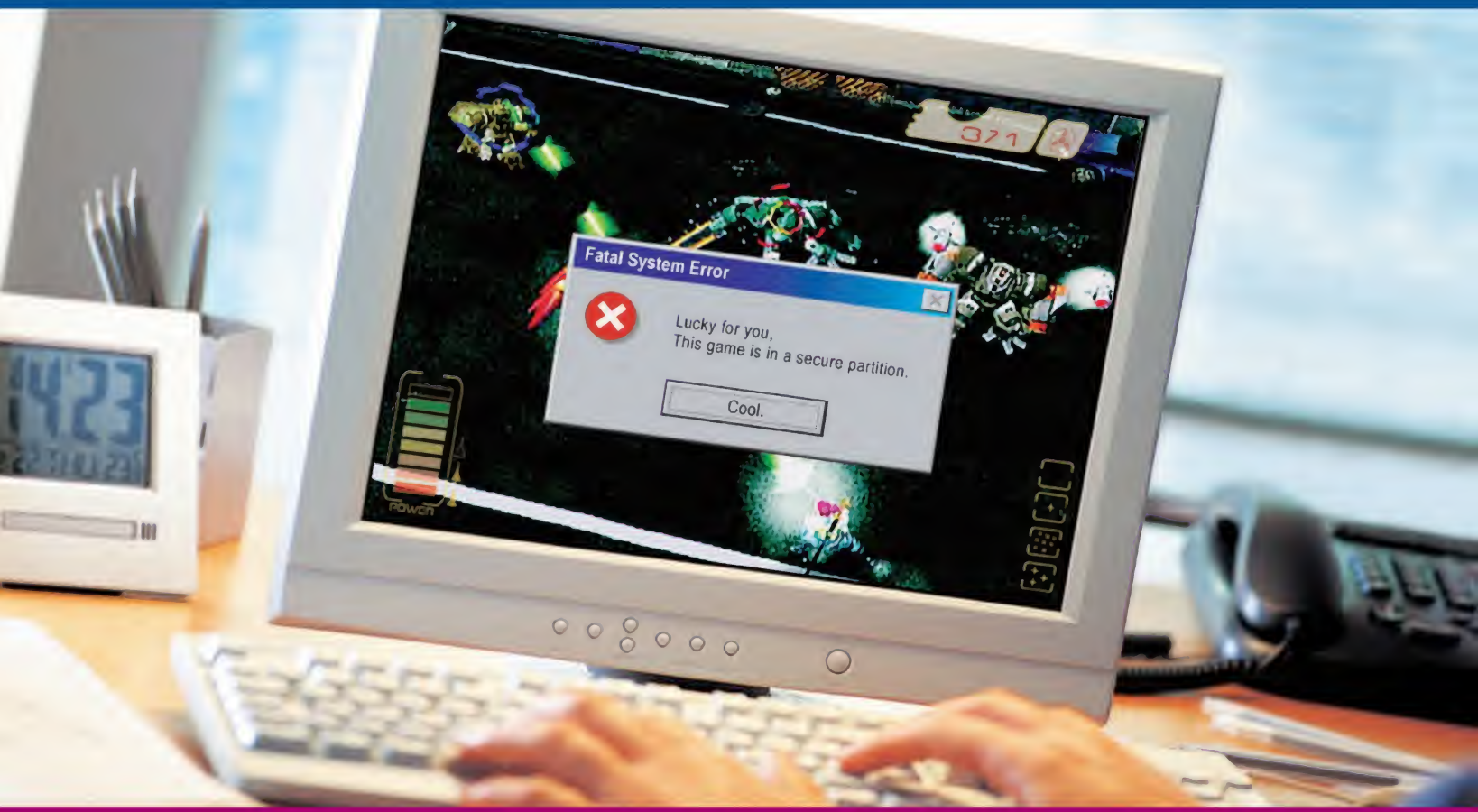

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On the Discovery channel

What's the most potent force in the universe? Ashton Mills found the answer in his pants while thinking about Cameron Diaz.

Everything starts, and eventually comes back to, sex. It's not like this is news, but it's fascinating seeing this core element of human nature evolve in its expression as we advance in technology. We have all these different mediums in our lives, and as sure as Cameron Diaz is the sexiest woman alive I doubt there is a single medium sex hasn't graced with its puissant provocative presence.

And none more so than our greatest achievement of communication since the dawn of bonking: the Internet. It does more than merely carry the erogenous ether around the globe – it's all but defined by it. Sure you can send email, read the news, play games and learn about things both beautiful and bizarre, but to a large degree the Net is being used as a tool for getting people off.

'Sure you can play games and learn about things beautiful and bizarre, but to a large degree the Net is used for getting people off.'

And in more ways than you can probably imagine.

Anyone who's ever typed in anything vaguely naughty into a search engine will discover the plethora of prOn sites available. The staples of online porn are of course images, movies, and stories that cover the gamut of eroticism from the prudent to the perverted.

But the use of such material is, for want of a better phrase, often just a singleplayer game. Not that this is a bad thing, for it's a game anyone can master with a little effort and frequent playing, with yourself. . .

It just so happens two heads, of a sort, are better than one. The Internet is increasingly being used in conjunction with Web cams to provide realtime international person-to-person sexual experiences the like of which wasn't possible only a few short years ago. It's even become, like porn sites, a profitable online business – where the participants prosper. There are services that allow people to display. . . performances. . . via a Web cam and receive monies for each viewer who tunes in. Anybody with a PC can be a star!

Interestingly, the forerunner of online eroticism began, of course, with Net sex. Pictures may well be worth a thousands words but a few well chosen phrases from the right person can feel *so damn good*. IRC and the gamut of instant messenger clients still play party to physically distanced people who are horny enough to get off on words and their imaginations alone.

In his 1973 movie *Sleeper* Woody Allen reveals great foresight in a character who, propelled 200 years into the future, discovers much to his disappointment that it's the done thing for people to use machines to safely have sex. For the movie it was a joke, but today people are actively working to make such machines a reality.

The science is called *Teledildonics*. Laugh if you will, I did, but this is a serious endeavour. Eric S. Raymond's Jargon File (www.catb.org/jargon) defines Teledildonics as 'Sex in a computer-simulated virtual reality, esp. computer-mediated sexual interaction between the VR presences of two humans.' The key here is 'computer-mediated' and can be expanded upon to include all sorts of interactive equipment.

Ultimately one of the goals of Teledildonics is to create full body suits that can stimulate the senses and provide an immersive sexual experience, even though your partner may be on the other side of the world.

Yet again the Internet will prove essential in providing the network through which such sexual passions are expressed. Just how essential is the Net right now? According to Jupiter Media Metrix, online pornography revenues will grow from US$230 million in 2001 to US$400 million by 2006. And when do people spend the most time fantasising? According to SexTracker, 70% of all Internet porn traffic occurs during the 9 to 5 workday, which lines up with an a study commissioned by the FBI in 2002 that revealed 78% of surveyed companies reported employees had abused Internet privileges by downloading porn. You can't hide anymore, we know what you *really* get *up* to at work.

Not unexpectedly, United Adult Sites confirms that more than half of all search engine requests are adult-oriented, with the most searched for word on the Internet being 'sex' – totalling more than the terms 'MP3', 'games', 'travel', 'music', 'cars', 'weather', 'health', 'jobs' and 'Bennett nekkid' (if you're into that sort of crazy, German stuff) combined.

Admittedly it's very hard, if you know what I mean, to measure precisely how much traffic is dedicated solely to the task of sending naughty notions across the globe, but it sounds about right. If aliens came to Earth and marvelled at our raucous humping desires I wouldn't be surprised if they noticed at the same time the clear evolutionary step that the Internet represents.

We've gone from being a bunch of hairy ape creatures who get turned on watching other hairy ape creatures procreate right in front of us to being a bunch of hairy ape creatures who get turned on watching other hairy ape creatures procreate somewhere halfway across the world.

Clearly we are now ready for jump gate technology and hyperspace communication arrays so we can plentifully enjoy and employ our hedonistic tendencies – not just from within our own solar system but from anywhere in the universe – all through the wonder of Teledildonics! Domination, leather-bound and terrestrially, is ours! All your sex are belong to us! Whoops, getting a little excited there.

But in all things we create is reflected our nature. Eons from now when we're showing younger races how to fold space and contain suns, we'll be giving them sex tips and a free copy of *Doin' It Monthly*. Hey, I bet it's on your mind right now isn't it?

Cool...

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Raptor your laughing gear around this

The F-22 fighter jet is a fairly serious piece of kit, but maybe not as serious as you'd think.

Hey, you know the F-22 Raptor? Yeah, the one that costs the United States something like US$70 billion in total, which is roughly AU$130 billion – or in other words, around about a decade's worth of Australia's total defence spending (amazing, ain't it). . .

To put this in perspective, the F-22 programme cost is roughly equivalent to the combined GDP (Gross Domestic Product) of the poorest 57 countries of the world combined for the year 2001 (according to the World Bank); or it's enough to buy around 92 million Pentium 4 3.06GHz HT CPUs; or nearly four billion cases of VB (longnecks of course, not cans. . .). That's a lot of beer (30 billion litres to be exact – although don't worry, it's not enough to fill Sydney Harbour, which has a capacity of something like 500 billion litres including the Parramatta and Lane Cove Rivers).

So, back to the F-22. It is without doubt *the* most advanced single-seat combat aircraft ever made, and light-years ahead of anything else yet built. That's not to say the Eurofighter Typhoon isn't cool, bless it, but in just about every arena the smart money would be on the F-22 to knock it out of the sky first.

What makes the F-22 such a formidable piece of kit? The 'four pillars of success' of the F-22 are: 'supercruise, superagility, stealth, and integrated avionics'. The first three cover its ability to fly supersonic without using afterburners (which saves a bugger-load of fuel, allowing it to 'cruise' at pace for extended periods for faster intercepts and ingress/egress); its high manoeuvrability, care of a liberal thrust-to-weight ratio as well as vectored thrust and an ability for very high angles of attack; and its stealth features making it harder to detect by conventional radar and IR means. The final one, though, is where my interest in particular is sparked.

The F-22 follows the United States' new high-tech vision of using information to outwit the enemy intelligently with surgical precision, as opposed to the historical method of overwhelming force applied with a broad, but directed, brush. No more B-52s carpet-bombing in the future, people – we're talking about being able to blind and cripple a nation's defences in the opening onslaught, then picking off key targets until capitulation while they flail in chaos.

(Yeah, it's all good on paper, but let's wait until the first 10 days of conflict have passed when the US has run out of cruise missiles, active guided air-to-air missiles, GPS- and laser- guided bombs, and starts to rely on 'iron' bombs and artillery again. The US forces would bomb *themselves* back into the late '80s in no time, and then have to finish it with the good ol' broad brush again. But, hey, I'm no expert. . .)

'That's not to say the Eurofighter Typhoon isn't cool, bless it, but in just about every arena the smart money would be on the F-22 to knock it out of the sky first.'

This vision is all about integrating all the different arms of the military, and sharing information in realtime to get the right 'assets' to the right 'objectives', and to 'neutralise' them as efficiently (but not as cleanly) as possible.

Or in other words: precision bomb the bejesus out of any poor suckers who happen to get in the way of the United States' plans for global order *cough* domination *cough*. Whoa, I'm getting a touch cynical.

We have already seen this philosophy in action – most recently in Afghanistan, where Special Forces on the ground spotted targets for the Air Force. These days the gound forces will use devices like GPS receivers and laser spotters to locate a target, then they'll use encrypted radio to inform the attacking aircraft of the position. This is a two step process, however, and requires the pilots to manually enter the information into their navagation and attack computers. The next generation will skip the middle man, and the external data will be seamlessly beamed into the flight computer without needing manual data entry.

So, when a Joint STARS (a next generation AWACS) plane detects a flight of MiGs leaving an airbase 200km away, the F-22 flight on patrol can immediately see the MiGs' position, altitude and direction without having to switch on its own radars and give away its position. The F-22 will automatically track, prioritise and designate the targets as necessary, and will calculate threats and countermeasures on the fly, so to speak. Impressive compared to the last generation of manual vectoring, detection, acquisition, missile guidance and countermeasures systems.

All this takes some serious computing power, and the F-22 has more than any other single-seat fighter around. But would it surprise you to hear that the F-22's computer systems run off old Intel i960 processors? You'd be forgiven for not remembering or having heard of the i960. It's from the '80s. It's a 32-bit RISC processor that's mainly used for I/O these days, on SCSI cards and like. It comes in speeds of up to, wait for it, 80MHz, and has a max L1 cache of 24KB – oooooweeee. . .

It's not all bad though, as the F-22 sports quite a number of them. The plane has two CIP (Common Integrated Processor) units, each with 66 slots that can handle both standard or custom modules.

Many of these modules include i960 processors, and can be configured on-the-fly to perform just about any avionics computing task.

Comparative to the Pentium 4 3.06GHz HT, the F-22's computer system can deliver around 700MIPS (millions of instructions per second), while the P4 can pump out over 9,000MIPS. Hey, it surprised me too.

Well, at least the F-22's computer system is liquid cooled – mmmm, polyalphaolefin. . . all it needs now is a Perspex side panel, some neon lights and blue LEDs.

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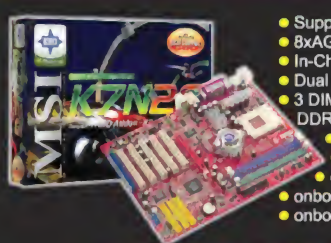

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TREND MICRO

IMAX computing

Daniel Rutter likes big. Big display devices in particular. If this is a feeling you don't share, well, you can just go home, and play with your tiny things.

Every true geek can appreciate the niftiness of really big screens.

Quite a few of us have even managed to figure out why it is that a one-metre-diagonal screen four metres away looks better than a 50cm-diagonal screen two metres away, even though they both take up the same portion of one's field of view.

Bigger screens further away make it easier to look at the image, rather than the screen, you see. Scratches and dust and phosphor lines and aperture grille damper wires are harder to see when the screen's further away. And your eyes are more relaxed when they're focusing closer to infinity. And, of course, more people can watch a bigger screen at once, without having to peer at it from extreme angles, or all sit on each other's lap.

Giant screens, however, are pigs to live with.

Giant CRT TVs are very big, very heavy, and pretty darn expensive. Rear projection sets can have bigger screens and are cheaper and lighter, but they're fairly delicate, have a lousier picture than CRT, and have cabinets you could park a blimp in.

Plasma screens don't eat all of your floor space, but they are not cheap, and their resolution is far from thrilling. A $10,000 16:9 46in plasma screen is only likely to give you 853 by 480 pixels, which is little better than a CRT TV with similar screen dimensions.

So, say I, the heck with that. If you have a mere few thousand bucks eating a hole in your pocket and a hankerin' for giant screen fun, get yourself a video projector.

Liquid Crystal Display (LCD) or Digital Light Processing (DLP), for preference; older three-lens Cathode Ray Tube (CRT) projectors give nice results for video, but they're big and heavy and generally rather dim, and they need regular tweaking to keep the three guns lined up. LCDs and DLPs can be small and neat (even a big one is likely to be a one-man carry), and 1,024 by 768 (or better) models are easy to find.

Some people say that projectors are for serious home theatre enthusiasts only. Their reasoning is simple enough: projectors are, indeed, not much good for ordinary TV watching or computer use, because you have to dim the lights to get a decent picture.

It's now easy to find impressively bright and highly portable LCD or DLP projectors for the price of a high-end CRT TV, but even a 1,000-plus ANSI lumen projector can only throw light, not darkness, so the darkest black a front-projected image can possibly contain is the same as the un-illuminated colour of the screen.

'So, say I, the heck with that. If you have a mere few thousand bucks and a hankerin' for giant screen fun, get yourself a video projector.'

In a room lit brightly enough that you can read a newspaper, no screen's going to be very dark. This means washed-out viewing – not as good as the results from even a basic rear-projection TV.

Far as I can see, though, this just means you'll need to buy a TV too. Big deal. Drop $300 on an undistinguished-brand 50cm set. Use that for any viewing where a giant attention-commanding display isn't called for – do you really want to see a whimsical weatherman larger than life sized?

When you want movies or sport or Hegemonia or a Winamp plugin on the big screen, draw the blinds, dim the lights, and whip out the projector from behind the couch. Or take it to someone else's house. Portability is a big plus for projectors.

You don't need much besides the projector, either.

A screen to project onto, yes, but if you have a good slab of white wall (or, for party purposes, ceiling...) handy, that'll do. A cheap second-hand roll-up slide projector screen will give you better results.

For everyday computing and competitive gaming, projectors are a rather perverse choice.

Consumables pricing isn't a problem: one few-hundred-dollar lamp every few thousand hours of run time isn't bad. The problem is that a really big display isn't practical to use, because you have to look around it all the time.

You do that anyway, even with an ordinary computer monitor: the central high-resolution spot in your field of view is only about three degrees across, horizontally.

Evend a plain 17in PC monitor would have to be about six and a half metres away for it to occupy only three horizontal degrees of your field of view.

To get the impression of a sharp view of a whole screen at normal distances, therefore, your eyes dart around as necessary.

That's how human vision works. But if the display's ultra-hyper-gigantic, you're going to have to move your whole head.

If you don't see too well then a vast display can be great, and it'll certainly put you right in the middle of your games.

If you have normal eyesight, though, then doing word processing on your wall is just weird. And if you have to move your head to see the whole screen in a game, you're unlikely to deliver your best performance.

Practicality's not what giant displays are about, though. They're about warming the cockles of your geekly heart. That's what they're all about – heart cockling.

And that, I think you'll agree, is reason enough.

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Brian's Big Woody

Technical details

- Intel Pentium 4 2.4B GHz @ 3006MHz (18x/167MHz FSB)
- Thermaltake Volcano 7+
- ASUS P4PE loaded motherboard
- Two 256MB PC3200 modules
- Western Digitsl 120GB
- ASUS 52X IDE CD-ROM drive
- Yamaha 24x10x40 CD-RW
- Xtasy Geforce4 Ti4600 128MB
- Creative Audigy Gamer w/ FireWire
- Four 80mm Antec case fans (two in/two out)
- Custom-built fan speed control panel and circuit board

The story

I have been building and customising PCs for ten years. I wanted a computer case that could house a high performance PC, and look nice in the home office at the same time.

So being a hobby carpenter, I decided I would have to build my own. Big Woody, as it has become affectionately known, is constructed from solid one-inch thick oak.

Construction took twenty hours stretched out over about a month. Only a couple items were robbed from a retail PC case, and even they have been heavily modified.

It took me quite a while to come up with a method of flush mounting the drives (ie. CD-RW) which would give them strong support but still allow them to be easily removed. Lastly, the oak was finished with many coats of tongue oil.

Dragan Jurisic's Dragon

Technical details

- Athlon XP 2000+ @ 1750MHz
- 512MB Corsair XMS3000
- Leadtek Geforce4 TI4600 My Vivo
- ASUS A7V333
- Creative Live! 5.1 DE
- IBM 75GXP 30GB
- Lite-On 48x24x48
- ASUS 32x12
- Custom-made Bay Bus
- L.I.S. (Lost In Space) LCD Indicator
- Two red cold cathode tubes
- Three 80mm Fans and a 92mm fan
- Silver-rounded cables
- Side hinged door

The story

Getting bored with my last case mod I decided I need something to better reflect my personality (and name) so the Dragon box came alive. As with most mods, the first step was to take a perfectly good working case and cut it to pieces – well at least a design into the side panels anyway. The left side panel dragon was cut out and the required Perspex was fitted along with locks and a hinge so that it can open as a door. The right side was a little trickier as it involved cutting the side panel, fitting etched Perspex and highlighting it all with six LEDs. The front bezel was carved out to reveal the Ying and Yang, which is lit up by four LEDs. The whole thing was then painted gunmetal externally, gloss white internally and then flames were airbrushed on. This was all done with the patience of my wife and the occasional head shaking and comments of 'crazy'.

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JB's ShadowCube

Technical details

- VIA EPIA-800 Mini-ITX motherboard
- On-board video/TV-out/sound/LAN
- VIA C3 800MHz @ 933MHz
- 512MB SDRAM
- 80GB Seagate HDD (quiet)
- Pioneer 16X slot-loading DVD
- Internal Logitech RF antenna
- 10mm clear and 5mm black opaque Perspex
- Adhesive vinyl used to black out internal components
- Attracts fingerprints like a magnet
- Dimensions: 220 x 210 x 230mm

The story

When I started building this machine, what I was after a small lounge room PC that would be a stylish addition to the rest of the furniture in the room.

However, I didn't want the box to be completely invisible!

To have a PC that would be semi-opaque, I decided to make the whole case out of two types of Perspex.

As I found out, this material isn't easy to work with, but using a large bandsaw and drill press made the job easier.

I'm pleased with the end result – when turned on in a dark room, the case is subtly lit with clear LEDs with control via a wireless keyboard and mouse (the RF antenna is mounted inside the case). The machine is primarily used as a DVD/DivX/MP3/emulation PC, and friends are surprised to see it playing DVDs and 1980s console games!

Tyrant 42's AT power tower

Technical details

- Duron 1.0GHZ @ 1.267GHZ (9.5x/133MHz FSB)
- Gigabyte GA-7VRXP RAID motherboard
- 256MB PC2100
- Leadtek Geforce4 MX440 w/ Crystal Orb
- Philips X-Wave Digital sound card
- Diamond Data 24x10x40x CD-RW
- LG 48x CD-ROM
- 10GB 5,400rpm Samsung HDD
- 40GB 7,200rpm Western Digital HDD
- 256MB Western Digital HDD

The story

This box began its life as an old AT server case that use to hold my Pentium 150MHz @ 166MHz. I had to modify the back of the case to fit a full-size ATX motherboard with its extra I/O ports, which was a bit of a nightmare as the case didn't cope well with the added instability with all the holes drilled in it – so I had to add a metal back to it and start again. I cut two holes for Perspex windows (top and side) with a jigsaw, and also the holes for the numerous fans I added. I built a four-switch fan bus for controlling the noisier fans, and also for headphone and mic connectors. Automotive neon was added for that lovely blue glow on the motherboard with its blue PCB. I then changed the boring green and red power and HDD LEDs to high intensity blue and white. With all the fans added I managed to get my 1.0GHz Duron stable at 1.267GHz, which helps with all those fps-hungry games.

BLUETOOTH USB DONGLE

SUPPLIER: Gigabyte
www.gigabyte.com.tw
PHONE: N/A
PRICE: $99

It's hard not to snicker at the word 'dongle'. Or maybe it's just that the *Atomic* collective has the stupid snickering sense of humour of an eleven-year-old.

Regardless, the word 'dongle' is rarely seen these days without the words Bluetooth or 'huge black' strapped alongside.

Gigabyte is the latest company to jump aboard the sluggish wireless connectivity bandwagon with its creatively-titled Bluetooth USB dongle.

As well as the dongle, Gigabyte has been kind enough to include a USB extension cord for those of us with an allergy to the rear of our PC cases, who are otherwise known as pussies.

This makes it even more convenient to detach the dongle when it's needed elsewhere. Thanks to the USB nature of this device, installation is a total and utter cinch.

Once you've plugged it in you'll be able to network with other Bluetooth devices, such as PDAs or mobile phones.

You can even network with other PCs with the use of a couple of these dongles, but why you'd ever want to do is beyond us.

Bluetooth just isn't fast enough for PC-to-PC communications – that's why we have 802.11.

VANTEC NEXUS MULTI-FUNC PANEL

SUPPLIER: EYO
www.eyo.com.au
PHONE: (02) 9822 2550
PRICE: $88

A modded PC without a tweaktastic front panel is like an American soap star without a boob job – it's just not on.

In the last 12 months we've seen a huge range of these front panels hit the scene, and the Vantec Nexus version is the latest panel begging to be whacked into any spare 5.25in drive bays you might have.

So what makes this front panel different to the rest? The inclusion of three differently-coloured face plates should be reason enough, as this means you shouldn't have any worries with colour co-ordination – a fact that will impress all but the most style-deficient of tweakers. Possibly the sweetest feature of this entire unit is the large dial on the front for controlling your CPU's fan speed. AMD users will surely appreciate this. When not gaming you can leave your fan at whisper quiet speeds, then crank it up to earth-shaking level as needed.

While the LCD panel doesn't supply anywhere near as much information as the *Lost in Space* panel we saw a couple of months ago, it still shows a couple of crucial bits of info: the temps from any of the three temperature probes included, and the CPU fan speed should also prove to be handy. Finally, a couple of USB 2.0s and an IEEE 1394 port round out the feature set of this very affordable gadget.

NINTENDO GAMEBOY ADVANCE SP

SUPPLIER: Nintendo
www.nintendo.com.au
PHONE: (03) 9730 9822
PRICE: $199

Everyone knows the feeling when you're stuck on a long boring bus or train ride and the only thing you want to do is play with yourself. Mobile phone games get real boring real quick and what you need is the variety delivered by Nintendo's Gameboy Advance.

Until now the GBA has been an awkwardly-sized unit with visibility problems stemming from the lack of a backlight on the screen. Nintendo realised this, and on 28 March is launching the GameBoy Advance SP, a much cooler kind of GBA aimed at an older market.

Inside a nifty new clamshell design sits an everyday GBA with a couple of funky new features. Throw away those AA batteries, for the unit relies on a built-in rechargable battery – plug it into the wall and charge.

This is handy because the all-new backlight on the screen sucks lots of power when turned on, but the sheer joy of a backlit screen makes up for the extra power drain.

The GBA SP is not a replacement for the original GBA, rather it is an expansion of the concept. At heart it is still the same old GBA, but the SP comes in a comfortable, stylish and refined package.

Forget playing Snake, the GBA SP gives hours of gaming pleasure for all ages.

NOTEPAD ICE PAD 2000

SUPPLIER: PC Toy
www.pctoy.com.au
PHONE: (02) 9617 1180
PRICE: $149

You might have heard about the tragic case that recently unfolded in Sweden when a scientist managed to toast his crown jewels by leaving a laptop on his lap for around 60 minutes.

While we have to question whether or not this is the truth (we're sure he was actually sexually attracted to a car exhaust pipe that was still warm), if this did actually happen, he's surely ruing the day that he didn't buy a NIP-2000.

It's a massive heatsink fan for the base of your laptop – not the sort of thing you'll want to lug around with you wherever you take your machine, as it weighs 1.7kg.

Most geeks couldn't even bench press something this heavy, let alone carry it around all day. However, when you're at home it could save your future child-spawning capacity, but it has a flaw that makes us wonder whether you'd be better off using a hard-backed book.

The problem is that most laptops won't fit perfectly on this device, as it has upraised edges along the sides. If your laptop happens to be bigger than the pad, its base won't sit flush with the NIP-2000. And in this case, the benefit of using the NIP-2000 over a much cheaper book or a slab of plastic or wood is negligible.

TOP MOUNT WINDOW KIT

SUPPLIER: PC Case Gear
www.pccasegear.com
PHONE: (03) 9568 0932
PRICE: $22

Now this is something new. While side-mounted window kits are becoming more common than kinky sex addicts in Kings Cross on pension day, this has to be the first window kit we've seen that is designed to be mounted in the top of your 'box o' pain'.

Due to the varying widths of PC cases, this kit is available in two flavours: 38 x 13cm or 38 x 11cm.

For the money, which is slightly less than two packs of tailor-made ciggies, you get a pre-cut Perspex window, rubber molding and a spacer to help you mark up the huge hole you're going to have to cut out of the top of your PC.

A highlight of the kit is the detailed instruction book that is included.

If you can build a 25-piece Lego kit, you're not going to have a problem installing this window.

That is, provided you're comfortable with cutting holes in metal with dangerous power tools.

The window even has a pre-cut blowhole to mount an 80mm fan in the top of your case, which will help improve cooling no end.

If you're really tricky you could even reverse mount the blowhole fan to use it as a hand dryer, like those used in bowling alleys.

KNIGHTRIDER LED SCANNER

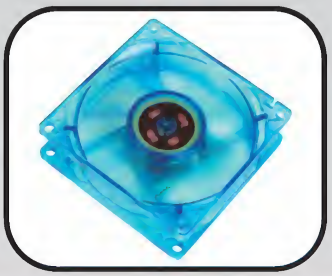
SUPPLIER: PC Case Gear
www.pccasegear.com
PHONE: (03) 9568 0932
PRICE: $29

Gotta love KITT from the awesome '80s *Knight Rider* series. Not only could he pummel even the fastest Ferrari into submission, he gave shit to any and all who were foolish enough to get in his way. But what really made KITT, and the feature that we all remember fondly, was his strip of flashy red lights that pulsed across the front of his bonnet. This piece of techno wizardry has made it to the PC after 15 years of development in a top secret Chinese Government lab.

No, your PC won't start making smartarse comments – we're talking about having a strip of LEDs that pulse from one end of the strip and back to the other.

Pointless, yes, but the memories of ardent KITT worship that it evoked brought a tear to the eye of even the most hardened *Atomic* staff member.

You can plug this unit directly into a Molex PSU connector for power, but PC Case Gear has come up with a much better way of installing it: it's figured out how to attach this gadget to your motherboard's HDD activity pins, so every time your HDD starts doing its thang, your PC will look like KITT. Yes, this is indeed a fine LED display, in a very cheesy but retro-cool '80s kind of way.



U V REACTIVE 80MM FAN

SUPPLIER: PC Case Gear
www.pccasegear.com
PHONE: (03) 9568 0932
PRICE: $14.50

One of the fundamental laws of case modding is that the brighter a product glows, the more you need it. And when it comes to glowy stuff, UV lighting is as glowy as you can get without actually mutating into a glow-worm. Which is where these cool UV reactive fans come into the picture. . .

We're not quite sure what scientistic process makes these things glow so well, but it's the same principle that makes your dandruff light up like stars when you're wearing a dark shirt in a nightclub decked out with black lights.

It almost looks as if the fan is radioactive, but you needn't worry about any of the hair loss or bleeding gums that are usually associated with radiation. Unless you happen to get your hair caught in the fan, or you jam the fan blades against your fleshy gums.

This 2500rpm fan uses a ball bearing mount for the fan, so it shouldn't seize up and die for quite some time, and it pumps out a maximum of 30CFM. Considering it manages to do this at a maximum volume of 27dBA, it's not a bad little performer.

It's a tad more expensive than your standard 80mm fan, but does your average 80mm fan glow brilliantly like a Chernobyl puppy?

DUAL COLD CATHODE UV KIT

SUPPLIER: PC Case Gear
www.pccasegear.com
PHONE: (03) 9568 0932
PRICE: $55

If you buy the UV-reactive fan, you're going to be disappointed if you don't happen to already have a UV light installed in your case.

That's because UV-reactive products need a UV light to glow, so without a UV light your reactive fan will just look like a normal fan, which will make you cry, as you've spent an extra $6 just so you could have a fan that lights up.

These UV lights are also known as black lights, as they don't emit visible light like a normal light source – instead the purple-black glow lights up ultraviolet-reactive products, or white surfaces like the aforementioned dandruff chunks.

This kit has two smaller than usual (8in as opposed to the standard 12in) UV cathode tubes, making it easier to fit each tube into a crowded case. Naturally they will provide a more even distribution of UV light throughout your case than a single tube.

Unlike some cold cathode kits, this one is ready to go without any soldering or wiring skills necessary, making it incredibly easy to install. It also includes an external switch so you don't have to rip the side of your case off every time you want to switch the light on or off. How's that for convenience?

Hidden and Dangerous 2

WHY WE CARE: **Mafia and the original Hidden and Dangerous were class efforts and both very enjoyable romps, so this new release from Illusion Softworks should be great.**
DEVELOPER: **Take 2 Interactive** www.illusionsoftworks.com
PUBLISHER: **Gathering Of Developers** www.godgames.com
PLATFORM: **PC / Xbox** **RELEASE:** **Q4, 2003**

When it comes to squad-based tactical combat, set during World War II, no game has come close to the excellent Hidden and Dangerous, and so we look to the sequel to take the next step.

Czech developer Illusion Softworks is bringing the sequel to new formats like the Xbox, as well as the trusty PC. After many delays, we might see it this year.

In the game, you find yourself pulling on the hob-nailed boots of Gary Bristol, a second lieutenant with the British SOE, the outfit responsible for most of the special operations attacks deep behind enemy lines during World War II.

The game will see you embarking on 23 missions, with goals including sabotage, kidnapping, stealing information and rescuing hostages. As the narrative evolves you will also become aware of a squad of SS troops who have been commissioned to take you and your men out, and this vendetta will add spice to the already challenging sorties.

Hidden and Dangerous 2 will play in a fully-functional 3D world and you will be able to control some great vehicles, such as mini-submarines, and even some of the world's first helicopters. BF1942 fans will appreciate the massive controllable armored units, which include the devastating German Tiger tank.

The new 3D engine Illusion Softworks created for the game is shaping up as very promising. As well as being better-looking than most of the games in this increasingly popular genre, the engine will calculate realtime ricochets and gravity-based ballistic arcs. Bullets will even ricochet differently depending on the hardness of the surface they hit.

Your team of soldiers will also each have unique skills, which will develop over time as you successfully complete missions. This worked well for games like Ghost Recon, and it makes sense in Hidden and Dangerous 2 as you will have a small pool of characters to choose from, and will want to develop them to better cope with the challenges the game has in store. You will be able to command a squad of three troops directly, but also be able to issue orders to other NPCs you come across, though these orders won't necessarily be carried out. The odd double cross should be on the cards and would add to the excitement factor of any mission you are trying to accomplish.

The sequel takes a wider focus of the conflict too and will see you visiting such diverse theatres of war as Africa, Asia, Eastern Europe and Russia.

The game will pack some fun toys, including sniper rifles, silenced weapons, explosives and heavier weapons, all of which you can use to take on tanks or enemy gun emplacements.

Hidden and Dangerous 2 will have a strong narrative-driven campaign with lots of character-driven plot elements that focus on what is happening between the members of your team. The game will also feature Counter-Strike-inspired multiplayer options, with groups of players playing as Allied or Axis forces.

Given the quality of the original game it's hard to imagine H&D 2 being less than a showstopper, even though it has to be rather impressive to beat newer titles like Flashpoint and Ghost Recon.

While it was actually due last year, the game's release date slipped as Illusion Softworks was busy finishing the excellent Mafia.

Now that the criminals have been let loose on the city streets it's time for the Czechs to again focus on Hidden and Dangerous. It should finally be here late in the year.

Indiana Jones and The Emperor's Tomb

WHY WE CARE: The whip-wielding legend has delivered in the past, and there is nothing to stop Dr Jones now – except maybe a receding hair line.
DEVELOPER: The Collective www.collectivestudios.com
PUBLISHER: LucasArts www.lucasarts.com
PLATFORM: PC / PS2 / Xbox RELEASE: Q2, 2003

Long before Ms Croft poked around forbidden crypts and began causing mischief, Indiana was getting on with the business of archaeological exploration without drooling attention from pre-pubescent fans.

The very first Indiana Jones game was released over twenty years ago on the now venerable Atari 2600 console, so given he has such a lineage, it makes sense that LucasArts has dusted the hat-wearing, whip-wielding hero off and begun work on a new adventure.

Naturally the game is set in the 1930s, 1935 to be exact, and Indy's enemies are still those leather-clad Nazis. However, this time around, the action is set in China with Indy chasing a new artefact, which he has to keep out of the wrong hands. Other places you'll muck around in include the jungles of Ceylon and the streets of Beijing and Hong Kong. With the shift in venue from the Middle East to Asia, there will be a number of new foes for Indy to battle with martial arts a big element.

In The Emperor's Tomb, the artefact in Indy's sights is the Dragon's Seal, and while the properties of this device are unknown, it becomes apparent it has something to do with the legions of undead you fight at one stage – not that the appearance of undead minions is anything new in an Indiana Jones game. It's also hardly surprising when you realise the game is being developed by a mob called The Collective, who recently completed the Buffy game for Xbox and is using the same basic engine for Indy.

Buffy was, at times, an enjoyable game that had a very combat-heavy feel to it, and this would seem to suit The Emperor's Tomb well, even if it might also make for hardly original gameplay.

Naturally, there will be some obvious changes when comparing the latest effort from The Collective to Buffy. These include whip-wielding to knock weapons out of enemies' hands or swinging from rafters. Those with a whip fetish will also be pleased to note that your whip will be something you can aim, and it responds to precise input rather than just having a generic attack direction. Instead, some skill will be required, so there is plenty of opportunity to make a right Russell Coight of yourself. Indy will also have a fair number of vintage firearms such as pistols, shotguns and machine guns.

Just because you can disarm opponents, doesn't mean your enemies can't send your gun skedaddling from your manly hands. There will be underwater levels, which judging from the screenshots, seem to borrow heavily from Ms Croft's games. Finally, The Emperor's Tomb will feature the odd on-rails level where you must fire at enemies as they pursue you while riding in a carriage or similar vehicle.

While Harrison Ford isn't on hand to give a voice to the game's hero, the development team employed an impersonator, and the visuals are very true to the films in that Ford's chiselled jaw is very recognisable. Asian architecture and large environments help the game look fresher than a twenty-year-old license should.

The action is also to be augmented by puzzle elements although these don't look like being much more than of the 'how do I open this door?' variety.

Coming to a range of platforms, The Emperor's Tomb will either resurrect Indy's videogame career or sink him whip, hat and all. Either way, we'll find out soon, as the game is due in a couple of weeks.

Halo 2: Combat Evolved

WHY WE CARE: The best console first person shooter could hardly spawn a dud sequel, even if it tried! And then there's the Warthog.
DEVELOPER: Bungie www.bungie.com
PUBLISHER: Microsoft www.microsoft.com
PLATFORM: Xbox RELEASE: Q4, 2003

Halo is far and away the most successful game released for the Xbox to date. Starting its life as a PC game and then making the transition to the console world didn't hurt Halo's play dynamics at all.

You might know Halo is also headed for the PC, but the most exciting development for its fans is the full-blown sequel to the Xbox game.

Halo 2: Combat Evolved is to be released this year, and the game promises the superbly balanced and adrenalin-pumping experience that first title delivered, while adding new elements and fleshing out the milieu.

In Halo 2, the action will pick up just after the end of the first game. The bio-mechanical suit-wearing hero, the 'Master Chief', has defeated the Covenant forces on Halo and finds himself heading back to the human colonies. However, as you'd suspect, not all is well. The last remaining human outposts have been comprehensively overrun by the Covenant forces.

Even worse, planet Earth is under threat with you stepping into the breach at the eleventh hour. The game begins with this desperate defence, and then as the action progresses, you will take the fight to the Covenant home worlds.

This should make for some fascinating new environments as the Covenant culture was barely explored in Halo. As the sequel pans out you'll begin to see more evidence of the symbiotic relationship between the combat oriented 'Elites' and the 'Prophets' – beings who manage the strategic decision making and form the bulk of the Covenant leadership.

The fact these two races have been seen as a united enemy up to now will also be dispelled. The 'covenant' between the Elites and Prophets might not be as strong as first appeared, with some interesting ramifications for the player. Developer Bungie hasn't disclosed any information in this regard, but hinted there will possibly be strife and differences between the two member races.

There will also be a third new race for you and the Covenant to contend with, but this race is yet to materialise in any of the pre-release material Bungie has made available.

However, some of the new weapons on offer have been spelled out. There will be a new sighted-machine gun. The weapon will have a sniper style mode as well as the usual 'spray from the hip' approach. Also new is a submachine gun with a ferocious rate of fire.

The Covenant will also have new weapons, as well as new units. And, as you travel closer to the seat of the Covenant's power, you will find yourself tangling with foes drawn from Prophet ranks, enemies who will no doubt have a completely new arsenal of weapons.

The vehicles that played such a part in the original game will also return with the human forces getting new versions of the Warthog.

There will be a more capable tracked variant as well as a faster quad bike for you to hoon around in.

The Covenant will also get some new toys, with the Shadow light four-troop transport combination attack craft being the only announced new vehicle to date.

Bungie has also made it clear the game will work online with the Xbox Live system (which is no big surprise) and Halo 2 will focus more on the two player co-operative modes that were so impressive in the original game.

The AI will be impressively polished as well. In Halo, enemies did react reasonably well on a small scale tactical level to the efforts of players, but in the sequel, Bungie has made it clear it is looking for a more strategic response, with not just the enemies in the immediate area responding to your advances. A broader strategic system of communication is planned with aliens being able to talk to each other across a wider network of systems.

The game will see that perennial favourite of developers working on a sequel: 'a greater level of environment interactivity'. However, unlike many other games which have promised this and then failed to deliver, it might just happen given Bungie's pedigree.

Halo 2's visuals will be retooled a fair bit and Bungie has responded to criticism of the first game which pointed to the use of replicated areas in the environments you visited.

This time around a new game design approach, which will see no two areas in the game ever looking the same, is being implemented.

This new design work will also allow greater detail with a host of new effects including better looking greenery, even more scintillating light effects and a greater number of enemies on screen.

Halo 2: Combat Evolved will have more complex and interesting mission objectives and there will be less of the mundane 'get from point A to point B' stuff that was evident in the original game. As you have probably gathered by now, this sequel won't be so much about changing the basic formula that worked so well in the original Halo. Instead, Bungie is focusing on adding more polish, gameplay elements and depth to the original blueprint.

For those who want a much more colourful version, here it is, from Halo 2 designer Jason Jones, who reckons the sequel is, 'a lot like Halo 1, only it's Halo 1 on fire, going 130 miles per hour through a hospital zone, being chased by helicopters and ninjas. . . and the ninjas are all on fire, too.'

Who can argue with that?

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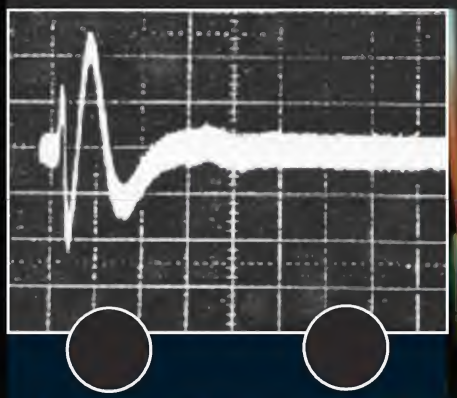
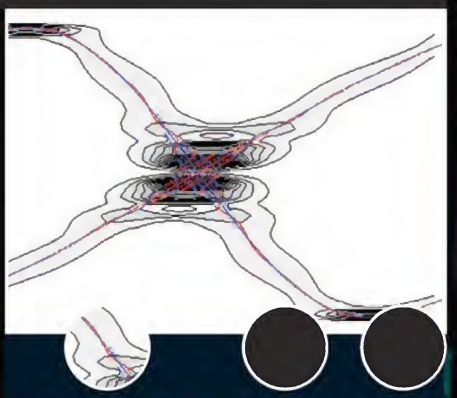
SWEET SOUNDING SIGNALS

SIMON PEPPERCORN PROBES THE PROCESS OF SOUND PRODUCTION.





Let's start with some basics. Sound comes in the form of a continuous analog wave, with a frequency range, which has an infinite number of points. The shape, length, amplitude and other elements of this wave determine exactly how it will sound. A digital medium, however, does not have an infinite number of points, and is made up of a number of 1s and 0s.

To get this analog signal onto a digital medium, the signal is split into thousands of pieces (samples) by an 'analog-to-digital converter' (ADC). Information about each piece, such as its shape and its relationship to other pieces, is stored. The more pieces the signal is split into, the more information that can be understood about it. The rate at which these samples are collected per second is called the sampling rate, and is generally expressed in kHz (thousands of Herz per second).

Using a process called 'quantisation' the converter looks at the maximum height or amplitude of a sample and splits it into bits. By increasing the number of bits, it can be reproduced with increasing accuracy.

During playback, a 'digital-to-analog converter' (DAC) creates an analog wave based on all the information it has collected and digitally stored about the pieces. Unfortunately, this wave will never be an exact replica of its original. It will be very close, but some of the original signal would have been lost.

The way it was

However, sound reproduction wasn't always so fancy. Electronic sound devices originally produced a purely synthesised sound by creating their own complex waveforms. This was achieved by mixing a pure sine wave, called a 'carrier' with a second wave, called a 'modulator'. By interfering with the shape of these waveforms, variation in the sound could be achieved, creating a crude version of the instrument each sound was meant to represent. This process was known as 'frequency modulation' (FM).

It was discovered that by merging a number of different carriers and modulators, with careful manipulation, even more complex waveforms were achieved. This added depth and timbre to the artificial sounds and meant it was possible to create a much closer approximation of real life instruments. However, the sounds were still very artificial.

In the late '60s, the Beatles, the Beach Boys and other chemically-affected musicians started producing some cutting edge sounds, using FM synthesis combined with traditional instruments and recording techniques. This trend continued through the disco era and into the '80s. If the name Harold Faltermeyer means anything to you, then you should know the type of sounds I am talking about.

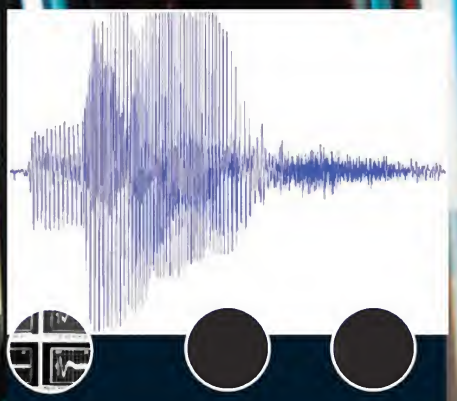
The later development of 'wavetable synthesis', meant that PC sound cards, electric keyboards and other electronic devices could now create realistic sounding acoustic instruments. Wavetable synthesis involves the use of 'samples', (similar to the analog-to-digital conversion process) which are miniature multiple recordings of actual sounds, converted to a waveform.

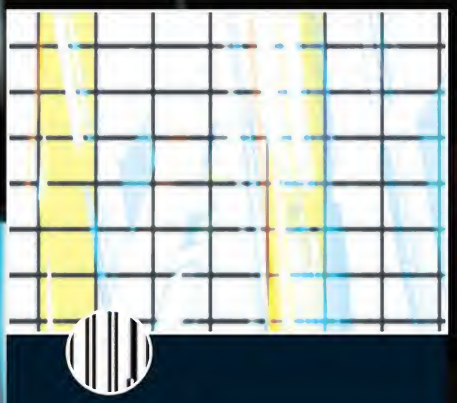
As revolutionary as this was, it actually presented a few problems. The realism and quality of the sound was impacted by things such as the recording techniques of the samples and the nature of the compression used when storing them. The more samples taken when recording a particular instrument, the more accurate its reproduction. However, in the days when 8MB of RAM was all your computer would ever need and sound cards and CPUs didn't have anything like the grunt now found in today's equipment, heavy compression was required to fit the samples into memory, and precious CPU load was needed to produce the required output. This ultimately affected the quality of the reproduced sound.

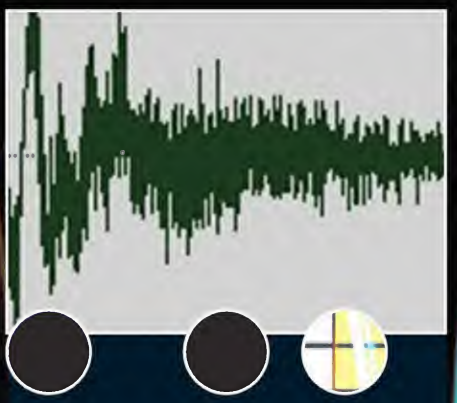
Stop it, that Hz!

The compact disc was developed in the 1970s. Seventy-four minutes of audio on a standard 120mm disc was achieved by using a sampling rate of 44.1kHz, with 16-bit quantisation. The later development of DVD allowed a much higher sampling rate. However, for reasons that are still not completely understood by us-who-are-not-driven-by-the-marketing-dollar, the standard sampling rate for DVD was set at 96kHz. Indeed, it would make more sense to use a sampling rate of 88.2kHz. This is double the sampling of the CD. It would be easier to achieve, and simpler to filter back down to 44.1kHz, for those without the higher end sound equipment. In fact, achieving 96kHz is quite complex, involving mathematical equations that would have had Einstein reaching for the paracetamol.

With the human ear detecting sounds from roughly 20Hz to 20kHz, it would be rare for you to hear any noticeable difference between 44.1kHz and 96kHz recordings, yet DVD Audio can produce sound from 4Hz to 100kHz. But getting 24-bits to wobble 96,000 times per second is so tricky that it isn't always done properly, often with results







that sound worse than 44.1kHz.

At the end of the day, it is commonly believed that the reason 'they' chose 96kHz was so that DVD technology was truly set apart from previous standards, making it a 'new' technology, not merely an upgrade. In other words, the standard DVD sampling rate was a marketing decision more than a technical one.

Still, nothing is perfect.

When you push a signal through all the components that make up your sound hardware, various errors are created. These errors can be defined as linear distortion, non-linear distortion and noise.

'Non-linear distortion' errors (which are deviations in the signal) are those which essentially create signals at frequencies within the signal that were not present in the original input.

'Harmonic distortion' is a type of non-linear distortion error, producing frequencies which were not present in the input signal. These new frequencies, known as 'harmonics', are frequencies at integer multiples of their input signal. Whether a harmonic is audible is dependant on its frequency and amplitude.

Maths freaks will probably get a kick out of this next type of error: 'Total harmonic distortion' (THD) is measured as the square root of the sum of the squares of the amplitude of each of the harmonics.

'Linear distortion' errors are those that do not actually create frequencies within the sound that were not already present in the original signal. Instead, these distortions affect the timing, size and relationships of the various frequencies within the signal.

You often see 'frequency response' listed in the specs of sound hardware. This is a form of linear distortion, and can basically be described as the ability of the device to respond to variation in pitch without affecting the relative loudness. 'Frequency response' errors are the most obvious ones in terms of what your ear can detect, and specified by indicating a particular frequency range and its tolerance. Simply put, the wider the frequency range, and its given tolerance, the better the sound device is performing.

Both linear and non-linear distortion is related directly to and affects the output frequency of audio. Noise is a different type of error, in that it has nothing to do with the sound frequencies and is specifically not related to the input signal at all.

An important factor when working with sound is the 'signal-to-noise ratio' (SNR), referring to the level of sound that can be produced as a ratio to the distortion or noise (not the intended sound) it produces. Noise or distortion is created by errors or impurities added to the signal as it moves through the circuitry of the device. The better the components used, the less noise created.

Noise/distortion can be measured by using analysers, which separate the errors from the signal. These analysers use a fast Fourier transform (FFT) technique, breaking down complex signals into numbers of simple signals. These signals are then compared for differences, indicating how badly the sound is affected by noise or distortion. Often manufacturers will quote Total harmonic distortion + noise (THD+N) when listing specifications of their hardware.

Don't spill the popcorn

The lines are now blurring between PCs and home entertainment. Speakers normally reserved for higher end sound systems are finding themselves being used and even marketed for loud and thumping games, music and DVD movies on the PC.

We are finding sound card and speaker manufacturers are increasingly providing support for standards normally heard while fooling around with your sweetheart, in the back row of the cinema, when you should have been watching the movie. Sometimes the audio is the only part of the movie you manage to recall.

A soundtrack for a movie or game is as critical to its atmosphere as its visuals. There are a number of technologies that filmmakers and hardware manufacturers are incorporating into their products to provide the most immersive sound experiences yet.

Dolby is essentially a technology for mixing sound into its respective channels, for playback on almost any sound system.

Dolby Surround is made up from three channels: one channel each for left and right front speakers and a single surround channel for the two rear

speakers. Dolby Surround works well in most basic surround sound configurations, however the frequency response is somewhat limited, being 100Hz to 7,000Hz.

Dolby Pro Logic is an extension of Dolby Surround, using left, right and a rear channel, but adds a centre channel to the mix. The frequency response is the same as Dolby Surround.

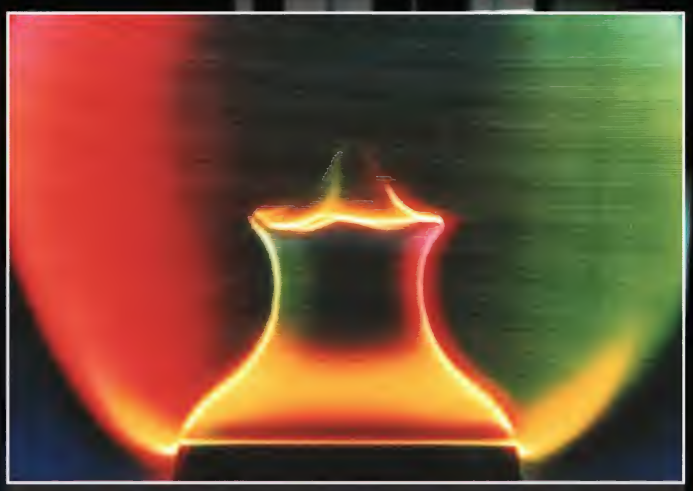
Dolby Pro Logic II is neat: it takes a vanilla stereo track and converts it to a 5.1-channel signal, creating a 'wider' field of sound then the original would have been capable of.

Dolby Digital allows for up to six individual channels, being left, centre and right front, left and right rear channels, and a low frequency effects (LFE) channel for the subwoofer. Dolby Digital decoders can decode Dolby Surround and Dolby Pro Logic tracks by down-mixing the 5.1-channel to Dolby Pro Logic. Dolby Digital sound is extremely good, even though it uses compression technologies which normally cause quality degradation. It does this by using an AC3 decoder, which removes all the sound elements from the PCM, which are outside the range of human hearing. The bitrate can also vary: 192Kb/s normally used for stereo, with 384Kb/s for 5.1-channel sound. However, this can be anywhere between 64Kb/s to 448Kb/s.

Dolby Digital Surround EX provides for three surround channels, on top of left and right front, centre and the subwoofer. To take full advantage of the extra channels, a Dolby Digital Surround EX decoder is required, as well as a 6.1-speaker system. This probably has the most realistic positional audio of all setups, and more manufacturers are producing sound systems that support it. If your sound card doesn't support this format, current versions of PowerDVD (which is bundled with most related hardware these days) are able to correctly decode all seven channels.

Digital Theatre System (DTS) Digital surround is fairly similar to Dolby Digital, using a lossy compression technique, but with a data rate of up to 1,536Kb/s. Dolby does use more compression than DTS, but Dolby claims it uses sophisticated data reduction technologies that DTS lacks.

THX is more a certification of quality and a defined standard, not a technology of its own. THX was designed to re-create cinema type sound in home-cinema environments and brings in a bunch of cool sounding features, such as Re-equalization™, Timbre Matching™, Adaptive Decorrelation™ and Loudspeaker Position Time Synchronization™. The blurb containing all these funky words can be found at www.thx.com.



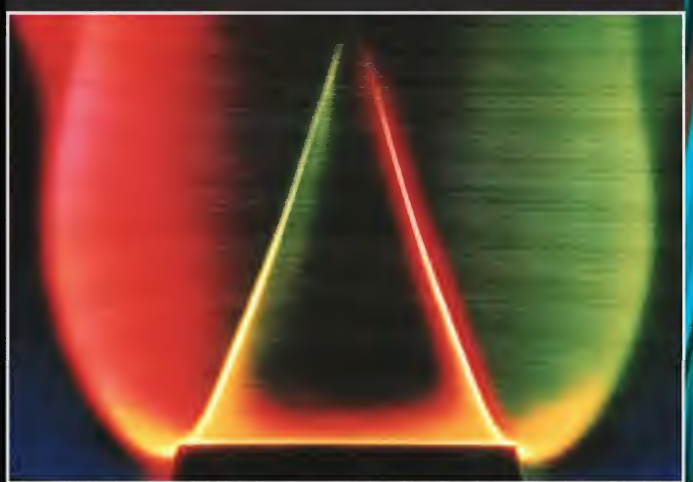
ABOVE: The flame subjected to acoustic modulation, changing its shape.

Although not a cinema standard, hats off to Creative, for bringing Environmental Audio Extensions (EAX) to the gaming world. EAX is a very popular API, developed and owned by Creative, but it can be freely supported by all other sound card manufactures.

To be completely accurate, EAX is an extension of Microsoft's DirectSound3D, part of the DirectX suite of APIs, which can be called by developers to alter the way a particular sound is played. Originally developed to add convincing reverb to sounds, it has been extended to add a wide range of effects, producing various audio environments, such as stadiums, concert halls, even bathrooms and stone corridors.

EAX Advanced HD adds more control over a particular sound, providing features such as 'time scaling' (controlling the speed a sound is played without affecting the pitch), and 'audio clean-up'. Advanced HD also provides a bunch of environment rendering functions. You can read Creative's marketing bumf at http://eax.creative.com/advanceeax.asp.

So whether you are making a mess in the back row of the movies, or thumping through the EAX-lined atmospheres of a first person shooter, the sound equipment involved is working its guts out to bring you the highest possible levels of realism and atmosphere. When considering purchasing sound equipment, spend as much as your wallet allows. There is a big gap between crap and quality. Don't let yourself down with second-rate sound.



ABOVE: A Schlieric visualisation at rest – the methane flame is undisturbed.

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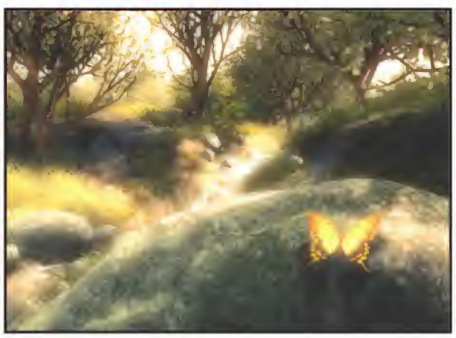
PIXELS AND VERTICES, TAKE YOUR MARKS

BENCHMARKING IS A HUGE PART OF WHAT *ATOMIC* IS ABOUT, SO THE OPPORTUNITY TO SEE THE CHANGES IN FUTUREMARK'S NEXT GENERATION OF 3D BENCHMARK WAS TOO TEMPTING FOR JOHN GILLOOLY TO PASS UP.

ABOVE: The opening scene of the Troll's Lair test.



ABOVE: The Mother of all Nature tests.

ABOVE: Post-processing filters at work.

ABOVE: Wings of Fury, the only DirectX 7 test.

It is a moment that leads to a serious reality check. While downloading the pre-release build of 3DMark03 it dawned on me that for the past few weeks the excitement level was not being built by the impending GeForce FX or the tantilising prospect of an Athlon 64 CPU actually being released this year. No, the excitement was pumped up by the knowledge we would finally get our first real look at the end results of DirectX 9, in the form of the most popular benchmarking program.

3DMark is an oddity in the world of hardware testing. While most benchmarks we deal with fall heavily on the side of arcane and esoteric, 3DMark has not only pierced the consciousness of enthusiasts, it has developed a fanbase. This is not just due to the fact that 3DMark is one of the least disputed and most reliable indicators of gaming performance. It is also because 3DMark has become an outlet for tweakers and overclockers to strut their stuff, with the online result browser (ORB) a very different place from when the *Atomic* Labs managed to grab first place for a week in the aftermath of GeForce3.

As furore rages over the inbuilt biases in SYSmark2002 and UT2003's fluctuating botmatch results, 3DMark stands out as suffering problems with cheating but only one quickly resolved accusation of bias. The company behind 3Dmark, Futuremark, recently changed its name back from the zany (and somewhat absurd) Madonion.com and has repositioned 3DMark03 as being more than just a 3D graphics benchmark by adding a 3D audio CPU load test and bringing back the CPU test from 3DMark2000.

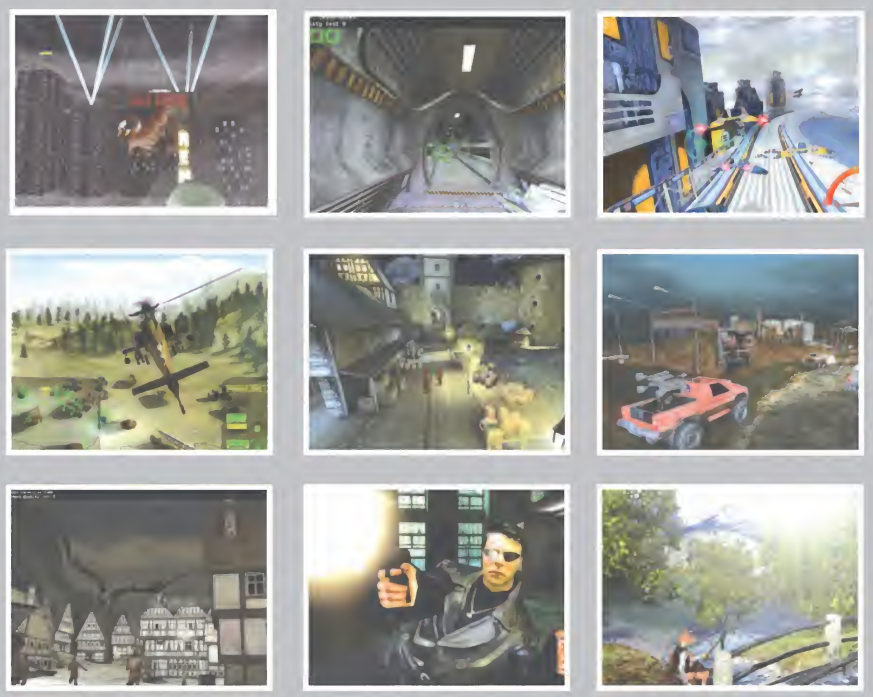
In order to understand just what 3DMark03 does, we need a quick trip back in time, when things where simpler; Max Payne had only been shown off at one E3 and Finnish company Remedy Entertainment released a DirectX-based benchmarking program called Final Reality. While it was a spin off of years spent in the Finish 'Demo' scene, where coders vie for the honour of being named the best generator of pointless 3D eye candy this side of id Software, Final Reality became the seed for the first 3DMark, the DirectX 6.1-focused 3DMark99. This was back when the battle lines were drawn between playable 32-bit colour and screamingly fast 16-bit colour.

The next year heralded DirectX 7 and with it came 3DMark2000, which introduced a new generation to the joys of watching a helicopter cut loops of a valley for hours on end. Following suit, DirectX 8 was joined by 3DMark2001, and apart from a minor revision to accompany ATI's more advanced shader standards, so things have stood until now. With the long delayed release of DirectX 9 finally behind us, 3DMark03 is now ready. In the case of 3DMark03, there is one DirectX 7 test, two DirectX 8 level shader-based tests and one beast of a DirectX 9 test to round it off. Because of the unlikelihood of any new DirectX versions being released until Microsoft's next generation Longhorn OS hits in a few years, 3DMark03 is the most forward-looking version so far. Our first impressions were dominated by how easily a 3.06GHz Pentium 4 with 1GB dual-channel DDR-RAM and RADEON 9700 PRO was made to whimper like a school girl, and our tip is that we won't experience most of the tests running smoothly for at least a year. You'll soon be seeing a lot of 3DMark03 results in *Atomic*, so we have seized the opportunity to break 3DMark03 down into its requisite parts and dissect just what each test does and how it differs from previous versions.

THE TESTS:

Wings Of Fury

This test is for those who are still running a DirectX 7 card such as a GeForce2 or RADEON 7500. DirectX 7 is getting very long in the tooth, and game design is moving beyond the meagre capabilities of fixed T&L units. Wings Of Fury is equivalent to the Helicopter and Adventure tests in 3DMark2000 and the Car Chase and Dragothic scenes from 3DMark2001. The extensive use of Vertex Shader 1.1 is emulated by the CPU for older hardware and heavy use of particles to replicate the chaos of a WWII bombing raid.



ABOVE: From DX 5 in Final Reality, to DX 8 in 3DMark2001, there were huge 3D tech leaps.

Battle for Proxycon

Leaving everyone who lacks at least a GeForce3/RADEON 8500-level card behind, we move on to the DirectX 8 tests. Many have commented on just how jaw-droppingly gorgeous the Nature test was in 3DMark2001, and this level of graphics is mid-range for 3DMark03. Unashamedly giving a nod to DOOM III, Proxycon is heavy on the dark and moody swinging light effects that have become popular with first person shooters in recent years. Unlike the next test, this one is designed to stress in-game performance and is heavy on the shaders.

Trolls Lair

Part two of the DirectX 8 testing is one that Futuremark says is designed along the lines of a cutscene using an in-game engine. Despite sharing support for the same hardware, Trolls Lair differs from Proxicon in that it uses a few different tricks. One particular standout is the main character's hair, modelled with great complexity, animated using the vertex shaders and anisotropically lit. The introduction of programmable shaders and the complexity that it brings means that two tests are much better than a single one for giving an indication of DirectX 8 performance. Thanks in equal parts to the Xbox and NVIDIA's big push behind Cg, DirectX 8-level hardware is being supported in games quicker than ever, making these tests incredibly relevant to games and hardware appearing this year.

Mother Nature

It will be a while before we see anything as subtly complex and beautiful as this DirectX 9 test in a game. While lacking the instant impact of the previous generation Nature test, Mother Nature is light years ahead in all regards. Each leaf and blade of grass is properly animated and modelled and the water is simply the best anyone in the *Atomic* Labs has seen. By the time we get to this test we have already left behind everyone but RADEON 9500/9700 owners. Even the once untouchable GeForce4 won't run it, with NVIDIA missing this piece of the puzzle until GeForce FX hits the market. Out of all the game tests, this will be the best indicator of the relative performance of future video cards and games.

3DMark score

Just like previous generations, the 3DMark score so prized by overclockers is generated from the four game tests. In recognition of its growing popularity, the pre-release version of the benchmark shipped with the Demo and the final 3DMark score disabled in order to stop anyone leaking the world's first DirectX 9 GeForce FX versus RADEON 9700 benchmarks onto some anonymous little Geocities Website. As we did with the move to 3DMark2001, over the next few months you'll see us phasing in DirectX 9 and 3DMark03 for our graphics card testing after we evaluate the benchmark and its relevance to current hardware.

EXTRA TESTS

There are also several other tests within 3DMark03, which while not influencing the 3DMark score, give important information about 3D performance. The first tests single and multi-texturing performance by throwing swirling textured surfaces at the screen. It is very similar to the tests in previous versions of the benchmark, but like all of the tests, the results are not directly comparable.

Next we have a new twist on an old theme. The Vertex Shader speed test involves a space filled with 30 trolls all running around trying to club each other, much like the mini-Max Paynes that ran around shooting each other in 3DMark2001. This test throws around 700,000 skinned polygons in all.

Vertex shaders are popular for animating characters and the Physics test focuses on this aspect. 3DMark03 includes a complete physics model called Havok, similar to the Karma physics engine employed in UT2003. These 'rag doll' physics are increasingly common and the Physics tests throw a pack of orcs off some rafters, with the physics engine combining with the vertex shader to handle the animation of the bodies as they bounce and fall to the ground.

One of the most technically stunning parts of 3DMark03 is the pixel shader test. Using different shaders for marble and wood, this test renders an elephant and rhino sculpted from marble atop a wooden stand. It is an amazing display of how powerful pixel shaders can be when used right and demonstrates the sort of quality that NVIDIA has been harping on about for the past six months.

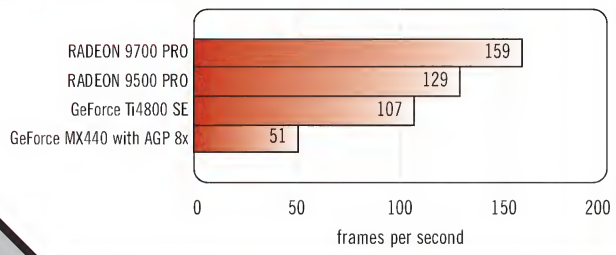
All these tests can be run with varying levels of texture filtering and antialiasing. One interesting aspect is that the benchmark now features a 'high detail' setting. Instead of antialiasing you can set the Pixel processing settings to 'post-process', which renders the scene to a texture then uses the pixel shaders to add special bloom and depth-of-field filtering to make for a more stylish looking scene. This feature affects the DirectX 8 and 9 benchmarks and not Wings of Fury.

GAMING, NOT JUST GRAPHICS

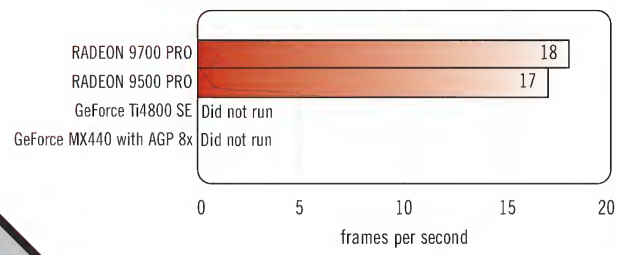
As mentioned before, Futuremark has made an effort to turn 3DMark03 into more than just a test of 3D graphics. Both 3DMark99 and 3DMark2000 featured a low detail CPU benchmark mode designed to minimise the impact of the graphics card and maximise the CPU influence. Programmable shaders have added a whole new string to the CPU benchmarking bow and 3DMark03's CPUmark result reflects this.

The CPU tests run the Wings Of Fury and Trolls Lair benchmarks at low resolution but with geometry at normal level. 3DMark03 goes one step further than previous benchmarks by

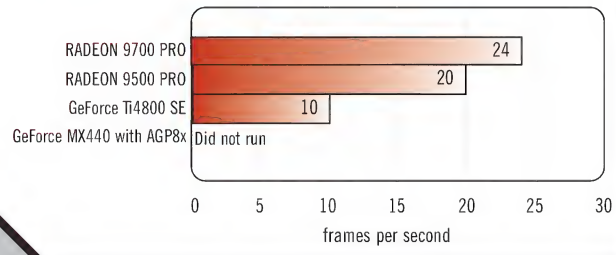
Wings of Fury



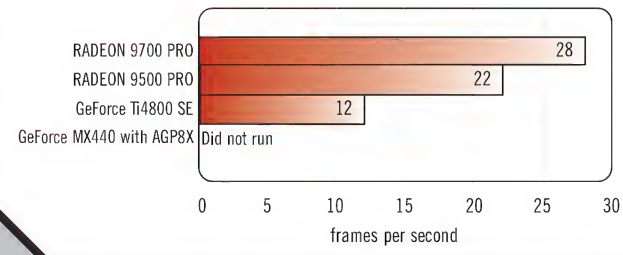
Mother Nature



Troll's Lair



The Battle for Proxycon



then running the vertex and pixel shaders in software, loading the CPU right down and ensuring that the benchmark has headroom to scale over the next couple of years.

The final piece of the puzzle is the 3D sound test. This runs a variant of the Wings Of Fury test, first with no sound, then with 24 sounds and finally with 60 sounds, if supported. You can then compare the no sound demo framerate with the other results to see how much that sound is slowing your system. Such a benchmark has been needed for some time and we hope more work will be given to this aspect in the future.

PRO TOOLS

3DMark has always been more than just the free benchmark downloadable from Futuremark's Website. The full Pro version includes a suite of extra functions, and this time around these functions have received ultra-special attention.

Gone is the somewhat clunky wizard-style batch run interface and in its place is some good ol' honest batch file support. Simply create a batch file containing command line switches and you have an easily replicable and highly tailored benchmarking program setup. Another casualty is the Result Browser, which has been superseded partially by an enhanced online Result Browser for Pro users and a shift towards XML as the default file format. Simply hit a button to have all your data exported to Excel, which also happens to handle the save file format used by 3DMark03.

Rather than the limited single frame image quality tests featured in 3DMark2001, Pro users now have complete control over what frames are rendered and what settings are used. This allows for more extensive comparisons between systems and should make the already very handy image quality tools an invaluable part of our testing suite.

After ATI's infamous mipmap 'bug' in early RADEON 8500 drivers, 3DMark03 now has a test for texture filtering. This is a simple rendered pattern inside a tube that can be rotated and moved so you can get a visual check of the various filtering techniques.

But perhaps the most outstanding part of the Pro package stems from work done with Entech in Taiwan, makers of Powerstrip. Unlike previous versions, 3DMark03 delivers details right down to the intricacies of the RAM chips used in your system. This data is generated as an XML file and is a great troubleshooting tool.

Custom benchmark

Even though we are unable to get a full 3DMark score out of the pre-release version, we have been able to get frame rates from the tests. So we have taken four cards, the DirectX 9-compatible RADEON 9700 PRO and RADEON 9500 PRO from ATI, the DirectX 8-compliant GeForce 4 Ti4800 SE (essentially a GF4 Ti4400 with AGP 8x support) and the DirectX 7 GeForce4 MX440 with AGP 8x.

In keeping with the forward looking focus of 3DMark03, the GeForce4 MX440 with AGP 8x can only run Wings of Fury and does so with a fraction of the speed of other cards, thanks largely to the increased CPU load that comes from having to emulate the vertex shader portion of the test in software.

Battle for Proxycon and Trolls Lair are real eye openers to the relative performance of the GeForce4 Ti4800SE and the similarly targeted RADEON 9500 PRO. In these shader-heavy tests the RADEON 9500 PRO is almost twice as fast as the Ti4800SE, with the RADEON 9700 PRO taking a close but comfortable lead.

Mother Nature, besides being the first test to reject GeForce4-level hardware, is a monster, and seems to be restricted not by memory bandwidth or core speed, but by the shading unit itself, with the 9500 PRO only one frame behind the 9700 PRO in the end. Once we have our hands on the final version of the benchmark we will explore these differences further, but for now an interesting picture of performance between cards is emerging.

3DMark03 is a landmark achievement. As a tool for reliable benchmarking of 3D hardware the 3DMark series has been the standout application for many years and 3DMark03 brings not only newer, sexier eye candy but also an immensely powerful and wide-ranging suite of testing for many aspects of gaming performance. Expect to see a lot more of this program over the next few years, especially now that games are adopting programmable shaders at an ever-increasing rate.

We wonder how long it will take for some loon hepped up on liquid nitrogen to go for the 10,000 mark, or for the first accusations of bias to emerge, or whether NVIDIA or ATI will boast the fastest DX 9 card. For now, we will settle with being able to benchmark for the future rather than for the past.

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3D MARKIN' WITH TERO AND PATRIC

TO GET THE FULL LOWDOWN ON 3DMARK03, *ATOMIC* WENT TO THE SOURCE AND ASKED TERO SARKKINEN (T.S.), EXECUTIVE VICE PRESIDENT OF SALES AND MARKETING AND PATRIC OJALA (P.O.), SENIOR MANAGER, BENCHMARK DEVELOPMENT OF FUTUREMARK CORPORATION FOR A FULL RUNDOWN.

– HOW LONG HAS 3DMARK03 BEEN IN DEVELOPMENT AND HOW DOES THIS COMPARE WITH THE DEVELOPMENT TIME OF PREVIOUS VERSIONS?

T.S. We have developed 3DMark03 full-time for about one year (we launched 3DMark2001SE in January 2002).

However, we started initial research and development already long before that, so all in all the development time has been fairly long – longer than for the development time for 3DMark2001 for example.

– IS THE ENGINE STILL USING MAX-FX? HOW MUCH LEFT REMAINS IN THIS ENGINE AND HOW EASY IS IT TO EFFICIENTLY ADD DX 9 FEATURES TO IT?

T.S. This is an important change we have made in 3DMark®03. Our previous products have all used MAX-FX as the 3D engine.

With the introduction of vertex and pixel shaders in DirectX 8, massive middleware became needless in 3D games for hardware with full support for DX 8 or later. Therefore 3DMark®03 is basically directly written onto DirectX. We used a small library of helper functions in order to avoid unnecessary rewriting for each test.

All vertex processing is handled by vertex shaders and all pixel processing (except for game test one and the fillrate tests) is done with pixel shaders. This makes 3DMark03 a very forward-looking benchmark, and it might scale somewhat differently than many games available today, which still mainly rely on fixed function vertex and pixel processing.

Then again, the mission of 3DMark is to give an insight into how a given hardware performs with the next generation of 3D games. This is also a key difference between 3DMark and a game used as a benchmark. 3DMark is able to tell you the objective performance of your hardware, while a specific game will tell how your hardware performs on that one specific game.

– IN YOUR OPINION, WHAT ARE THE MOST EXCITING FEATURES OF 3DMARK03?

T.S. Well, aside from the tests being incredible eye-candy, it has to be the totally revamped Pro ORB, ie. Professional Online Result Browser. This is enabled in the Pro version only, and allows you to do even more extensive searches and compare against multiple other results at the same time. As we have an active user base of over one million, the Pro ORB is just one unbelievably cool tool and resource.

As far as individual tests go, I am particularly excited about the totally new 3D sound performance tests, CPU tests, and the image quality tools. We enabled image quality tests to be more accurate and reliable by letting the user run any scene with so-called frame-based rendering, ie. dictating the test to draw all screens that would appear if the fps were kept at the specified constant level. This enables you to produce exactly the same screens in different systems in different benchmark runs. Then, you can compare the images and spot possible differences.

– HOW CLOSELY DO YOU WORK WITH HARDWARE AND SOFTWARE DEVELOPERS DURING THE DEVELOPMENT OF A NEW 3DMARK BENCHMARK? DO TRENDS IN GAME DEVELOPMENT INFLUENCE THE FEATURES THAT ARE USED IN THE BENCHMARK?

T.S. The very core of our approach to benchmark development is to work in close cooperation with the industry's key players. We have found it to be the only reliable way to ensure that we have the latest knowledge about where the industry is heading. This information is crucial in designing the workloads and tests. We spend several man-years in cooperating with the companies in our beta program as we produce our software.

The benchmark development process starts with us first conducting an extensive study using internal and external sources. This is where input from eg. game developers come into the picture. It enables us to sketch a general roadmap as regards what game developers believe will be important and relevant new technologies.

We then proceed and start working with our beta program companies and thus are able to get an industry-wide view of the most important technologies from hardware developers' point of view.

From these ingredients we then make basic decisions for the general direction of the benchmark. The end result of this phase is a specification for the benchmark, which has been reviewed by the beta members.

The rest is then implementing the specification and working with the beta program companies as we send out milestones and collect feedback from them. These phases are called prototypes, alphas, betas, release candidates and finally the gold version of the software.

We use this particular process because it has proven to result in a neutral and balanced benchmark, which stays relevant during a substantially long period of time. This approach also enables all participating companies to have complete visibility on our development and they are able to give feedback on various stages.

– WHEN DO YOU THINK WE WILL SEE THE WIDESPREAD USE OF DIRECTX 9 FEATURES IN GAMES?

T.S. I am confident that DirectX 9 feature adoption in games will be faster than that of DirectX 8 features. This is mainly due to the fact that many ordinary folks will just be amazed

about how big a difference the new technology makes on their monitor screens at home.

However, game publishers obviously need to carefully make decisions on where to set a game's requirements bar.

Hence, the more low price point DX 9-compatible hardware there is available, the faster the new features will be adopted in games.

Speaking of which, we have been able to accelerate this process via a couple of ways.

In addition to the 3DMark demonstrating what is possible, we have successfully provided data of the installed hardware base from our massive databases.

For instance, our data proved to a game developer that the true installed base their game is more high-end than they had thought. They then made appropriate decisions and chose more demanding hardware requirements for their next games.

– WHAT LIFESPAN WILL 3DMARK03 HAVE? ESPECIALLY IN THE LIGHT OF THE FACT THAT MICROSOFT IS EXTENDING THE DURATION OF EACH DIRECT X VERSION, AND THAT IT IS UNLIKELY WE WILL SEE A NEW VERSION OF DIRECT X UNTIL THE LAUNCH OF LONGHORN.

T.S. Well, we still see 3DMark2000 being used quite a bit:) Quite frankly, we expect the lifespan to be several years. You must remember that 3DMark is the single most demanding benchmark for a PC, and only the real high-end gaming systems will be able to score high in the beginning.

It will take several years for the benchmark to become obsolete to the mainstream PCs.

– 3DMARK® HAS THE STRANGE HONOUR OF BEING A BENCHMARK WITH A LOYAL FANBASE. HOW DO THINGS LIKE COMPETITIVE BENCHMARKING FOR ORB HONOURS INFLUENCE THE WAY FUTUREMARK WORKS?

T.S. The ORB has been just a tremendous service that has let our users to show off what their systems really can do. It has grown to become the most popular section of our Website and it is largely due to the constant flow of feedback from the users and our talented Web team that has implemented many features based on that feedback.

The ORB contains over five million real-life benchmark results, so it is a goldmine for anyone interested in really digging deeper into PC performance.

We know users who keep their whole PC 'performance history' over there: they can easily see what a difference eg. a driver update or graphics card upgrade, did for their PC's performance and so forth.

We have realised that we have built a service that is really useful and valuable to our user base and we want to be able to keep on developing it further.

After all, our mission is to help consumers to make informed purchasing decisions.

So big thanks to everyone that has submitted their scores to ORB, keep 'em coming!

– WHAT'S YOUR VIEW ON THE NEW HLSLS: CG, DX 9 AND OPENGL 2.0? MANY DEVELOPERS HAVE JUMPED ON BOARD TO DO SHADERS THE EASY WAY, HOW WILL 3DMARK BE INFLUENCED BY THIS?

P.O. Our coders have been programming DX vertex and pixel shaders for something like two and a half years.

You could say they speak shaders fluently :-)

3DMark03 therefore only uses shaders in the original shader language. HLSL is a great thing, and makes shader programming much easier. The question if CG is the same or something else than HLSL seems like a difficult one.

You get a different answer (if any) depending on whom you decide to ask.

I'm one of those people who doesn't give an answer.

OpenGL 2.0 seems like an excellent thing, as it should reduce the need for hardware vendor specific extensions.

I think OpenGL will be a good platform for 3D benchmarking as soon as we get rid of the extensions.

Most old OpenGL game benchmarks measure pretty far the extension speed, even though it is the hardware performance that should be measured.

– ACCURATE SHADOWS ARE STILL ONE OF THE MOST INTENSIVE COMPUTING PROCESSES. VOLUME STENCIL SHADOWS ARE RELATIVELY FAST AND EFFECTIVE BUT CANNOT HANDLE GEOMETRY APPLICATION SCHEMES. SHADOW MAPS ON THE OTHER HAND HAVE RESOLUTION LIMITING FACTORS. WHICH METHOD WILL BE THE BETTER SOLUTION FOR REALISM IN THE LONG RUN?

P.O. I think this is up to the scene/game type where shadows are used. We used RTT (render-to-texture) shadows in 3DMark2001, and that car test was an excellent place for that shadow technique.

Lots of objects with dynamic shadows on a larger area. RTTs are also cheap in performance and therefore well suited for DX 7 generation games.

Stencil shadows are tougher on the hardware, but are maybe more realistic, since those include self-shadowing, and work 'automatically' on all objects in the scene. These seem like a good choice for enclosed spaces, with spotlights and less ambient light.

Shadow maps, where the distance from the light to the object is stored, seems like an excellent idea, but the implementation is pretty complex on some hardware.

This technique clearly has potential, but it would be more compelling to us, if all modern hardware would support the efficient implementation.

– TONE MAPPING IS A VERY EXITING FEATURE WITH THE HIGHER PRECISION OF DIRECTX 9. HAVE YOU GUYS EXPERIMENTED WITH THIS FEATURE? WHAT ARE YOUR THOUGHTS ON IT?

P.O. Tone mapping was not specced to be used in 3DMark03, and thus we haven't therefore spent much time with it.

– HIGHER ORDERED SURFACES HAVE BEEN TALKED ABOUT FOR YEARS, WHY HAVE THEY STILL NOT MATURED?
BEZIER SURFACES ARE USED COMMONLY ON THE XBOX, BUT PC GAMES RARELY USE THEM. WHAT ARE THE MAIN ISSUES WITH THE IMPLEMENTATION OF NURBS AND OTHER HOS? CARMACK WOULD ARGUE AFTER HIS EXPERIMENTATION WITH THEM IN QUAKE 3 THAT THEY 'AREN'T WORTH THE EFFORT' AS YOU CAN DO JUST AS GOOD WITH A FEW CLEVER TRIANGLES. HOW TRUE IS THIS?

P.O. This is also a feature we don't use, and haven't therefore much played around with it.

That displacement mapping feature seems like a cool thing, but due to limited hardware support there is none of that in 3DMark03.

We use normal mapping for geometry compression, which is not an HOS technique, but still looks pretty nice :-)

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Curiously fast.

Besides the speed, we've added a pile of new features. The site's been redesigned, and the forums have gone through a complete rewrite – more a case of 'out with the old, in with the new' rather than 'let's cram in some more crap and see what happens'.

Being the *Atomic* way, the site, it's forums and all features were hand-coded and it's all running on the new Acer Altos server – mad props to Acer for supplying such a sweet box.

Refreshing is always refreshing. So, here it is – the new stuff:

CURRENT USERS ONLINE – Now you can see how many other Atomicans are cruising the *Atomic* Website. No longer will you wonder in the depths of the night if you're the only soul probing the forums. At the very least, you'll know how many people are ignoring your 'super' midnight posts.

COMMUNITY CALENDAR – Calendars. Usually fairly boring, unless you need to know what day it is, but even then, some punk often forgets to cross off the days. And often, that punk is you. Well, that's not what this calendar is for. It's for the exclusive purpose of letting you (and us, because we often have no idea what the hell is going on) know what's happening during the month. Never miss an *Atomic* BBQ or LAN again. Unless you sleep in, of course.

NEWS COMMENTS – Got an opinion? Everyone does, so let other Atomicans know what *you* think of a news item. Is it controversial? Interesting? Old? New? Whatever. Express your views on the latest news in this section, without chogging up 'Comments – Website'. The server won't periodically eat your replies either! Gotta love V2.0.

NEWS SEARCH – You can search the news now. It's exciting. Really. So now, when we do put up an article of interest (and we do), you can go hunting for it with an SQL back end, rather than your hand and brain back end. Databases have so much going for them, so why not abuse a query or two?

NEWS ARCHIVE – What's the point of a search function for ten or so news posts? That's where the archive comes in. Now every news piece we stick up will be preserved through the ages on magnetic media. Well, until we develop isolinear data chips. They're in *Star Trek* so it must be possible?

NEW FORUM CATEGORIES – Hoorah! It's been a long time coming, but finally, we've invented some more, new, forum categories. Making the grade are 'Unix, Linux & Open Source', plus 'Networking' and finally 'Modding'. They're there – trust us.

We'll fix these as we go, compress a few, spread a few out, add some, remove some – you know, tweak until we bleed.

EXTENDED USER PROFILES – Want your MSN name and ICQ number in the *Atomic* user database? Do it. There's a bunch of other new fields to flesh out your online persona some more. Flesh is tasty, so there's nothing to lose.

VIEWING PROFILES – In addition to the extra chunking profiles, you can now view other users' profiles, and the info they provide based on their privacy settings.

Search for real names, ICQ numbers, phone numbers – whatever you need to contact that slacker 'MaGiC_IrIsH_FaIrY' who promised you a burn of the latest Gentoo.

PRIVATE MESSAGING – Messaging! In private! Need we say any more? Maybe a little: you can now send other users private messages to discuss forum topics, general gibberish and whatever. All part of the new forums package. Fleshing out the community. Fleshing everything out really.

BETTER FORUM SEARCH – Quick like a sniper round, so you'll be busting the melons of topics at a breakneck pace. The new search not only checks forum titles, it checks the contents of the thread as well. You'll find every post on any topic ever discussed in the *Atomic* forums you can think of, including those in the archives, in case you need to find the 'Jesus: Just a man' post again.

The question should be 'Why?', not 'When?'.

V2 SUCKS DEEP FROM YOUR OWN IDEAS AND REQUESTS. IT'S *YOUR* NEW PLAYGROUND.

STICKY AND LOCK THREAD FUNCTIONS – If it doesn't blow, and it's important, moderators can now lock threads so they can be preserved, and stick threads so they don't wander off down the page. No more bumping those exquisite posts. Mind you, good posts usually keep themselves afloat – *Atomic* staff announcements tend to sink, though.

ATOMIC GLOW – The best threads ever. If it's gold, you can vote for a thread to become part of the *Atomic* Glow – an archive of the most amazing, funny or just plain thoughtful posts. This title shouldn't be taken lightly.

ENHANCED MODERATING – Finally, moderators have more power to supervise, monitor and, well, *enhance* the forums. Along with locking and sticking, threads can be moved around to different topics, be reported by users, and set so that they don't contribute to user post counts (for those Nighteyes threads). There's lots of other stuff as well to make life easier for all.

QUOTING AND POST REPLY – Individual posts can now be replied to. When you click the 'Reply to this post' link, you'll be able to type a response that will appear back in the thread, along with the post your replying to. It'll be framed in a nice, green box, inside your reply, so people know what you're talking about. Context, Jim. You can now 'quote' yourself as well using the '[quote][/quote]' tags. Enjoy!

EMAIL VALIDATION – We can't guarantee you exist, or that you'll even post, but we *can* make you validate via email. Now every time a user logs a new account, they'll be required to validate through an email sent when they sign up. Just an extra feature that's been waiting too long to be implemented.

SPEED AND STABILITY – It's fast, and it's stable. New software back end, with fresh, clean code. Seriously hard work has gone into making this the best *Atomic* forum (at least until the next revamp comes along). Gone are the old problems (only to introduce new ones – hopefully not), with the inclusion of a transaction system for posting, better forum database handling and a generally better back end.

NEW USER RANKINGS – Mega-personalities who have been a godsend to the community will get better recognition with new forum rankings:

(0-25)	Serf
(26-50)	Initiate
(51-75)	Learner
(76-100)	Apprentice
(101-125)	Journeyman
(126-150)	Charge
(151-200)	Disciple
(201-300)	Master
(301-399)	Primarch
(400-999)	Overlord
(1,000-1,999)	Champion
(2,000-4,999)	Guru
(5,000-9,999)	Titan
(10,000+)	Immortal

As the weeks go by, we'll be tweaking and patching any little bugs that may make their way to the surface – and with the help of your boots we'll be able to squash them faster. Don't hesitate to post your comments, suggestions and bug reports in the 'Comments – Website' section of the forums, or email us at atomicv2@atomicmpc.com.au if you can't find what you're looking for in the feedback section.

If all else fails. . . well heck, just enjoy the newness!

The *Atomic* V2 Box - Acer Altos G700 with two *Atomic* stickers

- Dual 1.8GHz Pentium 4 XEONs
- Three 10,000rpm Ultra160 SCSI HDDs (RAID5)
- Onboard Gigabit
- 100Mb PCI LAN
- Dual 450W redundant PSUs
- 1GB PC2100 DDR-RAM
- ATI RAGEXL
- Onboard sound
- Hyper-Threaded – two physical CPUs; two virtual CPUs

XBOX LIVE & KICKIN'

STILL WAITING ANXIOUSLY FOR XBOX LIVE TO BRING YOUR CONSOLE ONLINE IN AUSTRALIA? BENNETT RING SHOWS YOU THAT THERE'S NO NEED TO BE IMPATIENT — IT'S ALREADY HERE.

'Welcome to the future of video gaming!'

These are the self-righteous words we faced at the beginning of our journey to create a Gamer Tag account on Xbox Live (XBL). Little did we know that, for once, such boldness could be so close to the truth.

While Australian Xbox owners have been waiting anxiously for the launch of Xbox Live, it's actually been laying a-waiting to be played since its US launch date, way back in November last year. A few experimental types decided to import the US Xbox Live Starter kit, and lo and behold it worked in Australia! Praise be to the Gods of the Net!

All you need are the standard XBL requirements: one unmodified Xbox (or one with a mod chip that can be switched off, as Microsoft won't allow modded Xboxes to play on Live, for fear of cheating), a broadband Internet connection (preferably with a 512Kb/s download speed, and a decent upload speed if you plan to host games) and more than a few hours to pummel Yanks into submission in MotoGP. You also have to be mentally prepared for the thousand and one Steve Irwin smartarse remarks that you'll inevitably face from the primarily American Live subscribers. If I have to say 'Crikey' one more time. . .

The starter disk included in the kit runs in both NTSC and PAL formats, so you can still use the kit on Aussie Xboxes. Perfect.

Got to get me one of those

We scrounged one of these precious kits out of the lovely folk at Burn (www.burn.com.au), one of the first Australian importers of the US Xbox Live Starter Kit. It costs a lousy $115, little more than a standard game, and for this you'll receive a small box containing the Communicator Headset, Starter Kit disc, and most importantly, a registration code to unlock a 12-month subscription. Once the 12-month subscription runs out, it's anyone's guess as to how much Microsoft is going to charge for the service, as no prices have been announced, but due to the peer-to-peer nature of the network most games should remain free.

Yep, you heard right: peer-to-peer. Every game currently on Live is hosted on a user's Xbox, while Microsoft's Xbox 'Datacenter' servers only handle friend and game-matching services. Wonder where Microsoft is spending the AU$2 billion it earmarked for the Live service? Can you spell a-d-v-e-r-t-i-s-i-n-g? The nature of the peer-to-peer setup makes it crucial that the upload speed of the host's connection is high, preferably 512Kb/s or faster. Certain games such as Unreal Championship and Ghost Recon allow a user to host a dedicated server, useful for games with large amounts of players.

The great thing about peer-to-peer is that there won't be a shortage of servers, but the bad thing is that fickle hosts often close servers in the middle of a game, especially if they're getting their butt handed to them on a platter. You might think that the peer-to-peer model wouldn't be able to handle large games very well, but we've been in 16-player races without a speck of lag or packet loss.

The fun begins

We tested the service on a BigPond 512K/256K ADSL account, and setup was as easy as you'd expect for a console-based service. Provided your router is supported, (head over to www.xbox.com/live to check), it's a simple matter of plugging your Xbox into the router via some CAT 5 cabling and setting up your account. Even simpler than that, but less convenient, is to plug the Xbox directly into your DSL/Cable modem via the Ethernet port, as we had to do when we moved to a location with a non-compatible router. You can even chuck another network card into your PC and use Windows' ICS feature to

ABOVE: The Xbox Communicator. The earpiece clips off so it can be mounted on any side, while mute and volume controls are on the plug.

ABOVE: The Live Dashboard continues the yummy theme from the Xbox dashboard, and is incredibly easy and intuitive to use.

share your broadband connection. Once you've patched in to the Xbox Live network, you're asked to supply information about yourself to set up your unique Gamer Tag. You'll need a valid credit card to prove you're an adult, but it won't be charged. A couple of the fields required that we faked some US details, such as the phone number, but other than that it was intuitive, and we'd set up our account within minutes.

The service only chews through approximately 20MB of data per hour, allowing those with 3GB caps to be able to play for around 150 hours a month (provided they don't do much else with their connections), so you needn't worry about Xbox Live being a bandwidth bruiser. Thanks to the non-existence of an Aussie Live Starter Kit, we're not sure if there will be any problems installing the Aussie version when the service finally hits our shores. But we doubt it. As the kit hasn't been properly launched in Australia, don't expect support from Microsoft, but the official Aussie Xbox forums are a good place to start: http://forums.xbox.com/ShowForum.aspx?ForumID=55

What's so good about Live?

We'll talk about the games in a second, but first you need to know the different features common across all Xbox Live titles. Trust us, you do.

Speak to me

The feature that has everyone talking (nyuk, nyuk) is defintely voice communications. The headset plugs into the top port on your controller, and has a volume control and mute button – remember the mute button, as people don't enjoy hearing you cough up your right lung. The headset is quite comfortable with a single adjustable speaker covering the ear of your choosing, although it would be nice to be able to adjust the headset's size. All voice is piped through the single speaker, while game sounds come through your regular speakers. A slight problem with this is that it's impossible to wear the headset and a set of headphones at the same time.

Voice quality is superb, especially when only one person speaks at a time, although it doesn't live up to the 'better-than-telephone' quality Microsoft claims. No doubt the distance between us and the US games doesn't help, so it's only going to get better as more Aussies sign up.

Lots of people all trying to talk at once can cause some distortion, but clever game design involving use of radio channels minimises this problem. For example, within MotoGP you can only hear the riders immediately in front and behind you, while in Ghost Recon you can only hear your own team. Voice masks can make you sound like a robot, small child or Demon from the 47th level of Hell – strangely, these are universally unpopular among Live players, but can be fun if you don't mind annoying people. A moment we won't soon forget was a guy singing 'Who let the dogs out?' in a deep robotic voice as the host of the game left to let his dog out. Side-splittingly-funny, but I guess you had to be there. The voice comms add an entirely new element that is not only humorous and social, but also rewarding to gameplay.

Will you be my friend?

Operating similarly to ICQ, Xbox Live gives each user a Friends list. If you do buy Xbox Live, head to the *Atomic* Forums' console games section and let us know your Live Gamer Tag. You can add players to your list mid game or search for them manually. Once they're added, you'll see when they're online, what game they're playing and also be able to join them or have them join you mid-game, which is a very cool feature. Unfortunately a couple of the Xbox Live games don't support this properly, but most do. You can also see just how bad your friends are at any game you might happen to play. That's right, Xbox Live has full statistics tracking. . .

Top of the world, Ma

No longer will you and your gaming buddies argue about who is the best player. Besides, you all know I'd kick your arse. Xbox Live keeps a record of every game you've played, and ranks each player in the world based on the statistics collected. The potential for organising fair and even tournaments as a result of this tracking is massive, and I wouldn't be surprised if eventually top players will be flown to the US from around the world to participate in tournaments based on their current ranking. Statistics can be reset to give you a fresh start in Live.

A match made in Heaven

Thanks to a feature called 'Opti-match', joining servers with players of an equal skill level to you is now a mere button press away. Or you could always join a server with people who are total newbies for a cheap ego boost. You can also join servers that are running the settings you prefer. You don't like Super-mega-quad-invisibility-boost-jump powerups? Then you need never play on a server with them again.

Now that we've covered the big features, let's look at the Live games that we've been playing. And playing. And playing.

Let the games begin

MotoGP

The Starter disk includes a demo of MotoGP, and it looks to be perhaps the most popular game on Live. Even people who thought they hated racing games are raving about it, it's that damn good. Only three levels are included on the demo, but completion of the full game unlocks all of the tracks and bikes for online use.

Now, it's a damn big call, but MotoGP on Xbox Live could well be the ultimate racing experience we've enjoyed. Considering we were playing on US-, German-, French- and British-based servers, lag was incredibly minimal, with most games having zero warping. That includes games with the full 16 players, most of who usually ended up in a smoking pile on the first corner. Occasionally a host would have a shoddy upload speed leading to a lagged game, but this was a rare occurrence, which will decrease as Aussies start hosting games.

Before the beginning of the race, all players can chat in the lobby, which is usually hilarious, and you'll also pick up a wealth of experience by listening to the better riders. During the race, voice is limited to the rider in front and the rider behind you and it's always nice to see the guy you're 1.75 seconds behind chew the gravel after a particularly cutting insult. If there is a single game that is going to make Live, it's MotoGP. Do we sound impressed yet?

Ghost Recon

The Xbox's answer to the PS2's SOCOM, Ghost Recon proves that online first person shooters can play well on a console. Due to the server browsing lobby system filtering out people with high pings, we couldn't connect to a game for several days. However, a patch should be out by the time you read this which will fix this problem. That's right, we just said a console game is getting a patch. Don't say we didn't tell you so. As a stop gap solution we used the Friends list to join games, and oh what a joy it was. Seriously.

As every player is using voice, team co-ordination is massively improved over what we're used to on the PC, that being. . . none whatsoever. Tactics such as covering fire, cover and move, and flanking were all employed effortlessly. We expected latency to be a problem, but were pleasantly surprised by the smooth playing conditions, probably due to the slow-ish pace of the gameplay. Even sniping was possible, proving that the network code is rock solid.

It looks as if Ghost Recon could be the Counter-Strike of the Xbox, with a slightly more realistic bent. We highly recommend it, especially once the patch is released.

MechAssault

MechAssualt is a fine example of what multiplayer can bring to a game. While it's merely decent as a singleplayer game, MechAssault ▷

ABOVE: MotoGP – the finest racer ever?

ABOVE: The lobby area of Ghost Recon

ABOVE: Scratch one arrogant Yank mech

ABOVE: Whacked – a different game on Live

ABOVE: UC looks good but suffers from lag

over Xbox Live is a total and utter blast-fest. Again, network performance was phenomenal considering it's a peer-to-peer game, being played on a server half way around the globe. Not once did we see a player warp or do some on the spot breakdancing moves.

The most enjoyable games were team-based, as the voice comms added immeasurably to the team cohesion and strategy. Larger mechs usually hung back towards the rear, while those in the zippier models picked at the enemy from the flanks in groups of two or three. Watching several giant mechs all storming for the same powerup pile is a great social observation of just how greedy people can be, not to mention a right laugh.

A niggling complaint we have is the fact that all players, regardless of team, are on the same voice channel. Another is that occasionally we'd get dropped from the server at the end of each game, but the quick joining process doesn't make this much of a concern.

While it seems quite simple at first, the underlying strategy that is needed for victory will ensure that MechAssault online will remain popular for years to come.

Whacked

When Whacked first arrived at the *Atomic* office a couple of months ago, after a mere five minutes of singleplayer it was relegated to the dust-gathering pile, never to be played again. And then along came Xbox Live. The demo of this game is included alongside MotoGP on the Xbox Live Starter Disk.

Whacked is a whole other game when you're playing against real people. If you haven't seen it yet, it's a third person deathmatch title with a game show theme and a maximum of four players – it's very humorous, as well as incredibly frantic. For some reason the players drawn to this game also happen to be quite funny; well, at least that's what they think.

Due to the high latency, a couple of the weapons within the game proved to be difficult to use, but the most were fine, and as we improved our skills we started to kick some serious booty, proving that lag isn't much of an issue.

Whacked online has turned out to be a great romp that doesn't take itself too seriously, yet contains some complex and varied gameplay under a veneer of pure fun. Check it out if you want to try something fresh, original and, most of all, enjoyable.

Unreal Championship

There had to be one game that didn't play too well due to the vast distance between Australia and the rest of the mostly US-based Live servers, and that game unfortunately proved to be UC. Latency proved to be a major problem when playing over an intercontinental connection because it's such a twitch-intensive game, based on furiously fast gameplay and sharp reflexes. Half the time we couldn't even see the shot we'd fired from our weapon, let alone hit anyone. Combine this with the fact our opponents would occasionally warp from one side of the screen to the other, and scoring a frag became a matter of luck and/or area spammage. However, when Xbox Live officially launches in Australia, expect the problems of latency to evaporate.

Many of the faults within UC have nothing to do with the Live service. For starters, as opposed to the clean and stark environments of Ghost Recon, UC's levels bustle with detail making it hard to spot enemies, thanks to the low resolution of TV. This is probably why every player has a huge pointer floating above their head to indicate their position to others, negating any use of sneaky tactics. If you're running a high definition TV, this won't be a problem; unfortunately these people only exist in the minds of Australia's HDTV policy makers. For the rest of us UC is a blurry mess, one that is nigh on impossible to spot an opponent through. Combine this with inconsistent frame rates, and UC ends up looking like the ugly inbred cousin of UT2003. But then again, maybe we've just been spoiled by UT2003 on the PC – but Ghost Recon doesn't suffer from this bias.

There is a patch on the way to tidy up the frame rate and to fix other issues with the game, but at the moment UC isn't very suitable for Aussie Live users, at least those who are using the Live service before it's officially launched in Australia.

I feel a-Live!

So there you have it. If you haven't guessed yet, Xbox Live rocked our world. It's cheap, it's easy to set up and it has stacks of features that PC online gaming would do well to copy.

We're a little disappointed that it's a peer-to-peer network, but so far this hasn't proved to be a problem. In fact, it's probably going to turn out to be a bonus due to the huge number of games that can be hosted. No hassling your ISP to host 'Deathmatch Frag Killa 2003' anymore kiddies — you want a game, you host it yourself. Eventually there will be client/server games, such as the upcoming Star Wars Galaxies, but you'll have to pay a monthly subscription fee for them.

So is Xbox Live 'the future of video gaming'?

We're going to have to say 'Yes.' If you happen to have a nice phat broadband connection linking you to the Net, as well as an Xbox stashed under the TV, do yourself a favour and check out what is truly the next generation of console gaming.

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Combining both an Ethernet and USB port, this ADSL modem can also serve as a router between a home or small office network and the internet. Using Network Address Translation (NAT) and Application-Level Gateway features, it can provide a firewall, protecting PC's on your network. Telstra Approved.

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The Billion Wireless Broadband Firewall Gateway provides SOHO and residential users the ideal solution for sharing a high-speed broadband Internet connection among a 11Mbps wireless network and a 4 port 10/100Mbps Fast Ethernet switch. It integrates a robust VPN firewall and routing functions with advanced 802.11b wireless technology.

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ATOMIC03

I REVIEWS I

THE PH34R

TIRED OF BEING WANTED ONLY FOR HIS DASHING GOOD LOOKS AND TECH SUPPORT SKILLS, JOHN GILLOOLY HAS A NEW PHILOSOPHY FOR LENDING A HAND.

I recently went through a series of conversations about computers with friends, relatives and those dollar-hungry occupants of the local railway station, and it reinforced the fact that a hell of a lot of people are still scared about what goes on inside a computer case.

You know the feeling from just chatting to people who aren't as tech obsessed as you are. They think the innards are a realm purely for those who have done some sort of training, and that merely removing a screw will start a series of cascading disasters that will render the entire earth into a smouldering lump. And the basic logic behind that assertion is fine, but the only thing being rendered into a steaming lump will be your brain after they show you their attempts.

But it need not be a terrifying experience, as we all know. After experiencing all those childhood pursuits like Lego, or model making, or the more adult pursuit of wrestling with the assembly of what looked like a straightforward set of bookshelves, I think everyone knows the basic 'put tab A in slot B' mode of construction. Well, at least I hope so.

I for one am getting tired of the 'I'm looking for a new computer, can you build one for me?' question. It's not that I can't do it, or lack the charitable impulse, it is just that I am sick of all that running around, gathering parts and then spending an hour or two losing skin from knuckles and wondering where the hell that screw went while trying to explain that just because it has power it doesn't mean you can play Solitaire yet.

Does this sound like a familiar situation yet? Do you also get roped in to build / tweak / remove pets from / troubleshoot other people's PCs? Are you mad as hell? Well, never fear for I have come up with a handy little set of advice to offer people when they lust after your tech skills.

It is a set of handy instructions to use when advising someone about a new computer. We all know what the good stuff is, but we also know what the fiddly stuff is as well. The first major quandary is the same for everyone, regardless of experience: what CPU? Athlons sometimes have tricky heatsink clips and a die that screams out 'crush me', but Pentium 4s have more confusing clips (at least two of them to worry about) and need a second power cord plugged into the motherboard (a prime source of constant 'it doesn't work' phone calls). Weighing things up, it would probably be better to go for a P4, purely because the heat spreader makes it a harder task to destroy the die.

With the CPU out of the way, it is time to choose a motherboard. For this I would suggest two things specifically that seem outrageous and offensive to an enthusiast. Tell them to get a board without RAID and with integrated sound (integrated graphics would make life easier but Intel 'Extreme' graphics is a divide that even we won't cross). This stems the inevitable 'what do I plug this drive into?' question as well as saving the builder from the fiddly troubleshooting and convoluted driver installs that accompany most add-in sound cards. Make sure it is also a full-sized ATX motherboard, so when the motherboard mounting queries arise you can tell them to use the corner holes to line it up.

You may have guessed that I am advocating a minimalist approach to this, so all we have left to add are a case, drives, video card and RAM. RAM is easy: just tell them to only buy one stick, to ignore the stupid numbering and just ask the salesperson to choose RAM that will work in the motherboard (the biggest effort you will need to make in this process is to recommend a competent retailer) – if you do this, you will halt (until they want to upgrade) all those quirks which arise when differing memory sticks are used.

As for a case to put it in, forget anything fancy. Fancy cases almost inevitably lack power supplies, and the last thing we want to do is try and explain the mind-numbingly simple process of installing a power supply. So a case with at least a 350W PSU is ideal. While lower power PSUs should run this system fine (seeing as it lacks the 15 extra fans and strobe lighting that we find essential for our PCs), you can never have too much power.

For this project, one hard drive and one optical drive are all that are needed. Choose a big hard drive, 80GB would be my choice. As for optical, the only choice is a CD-R/DVD combo drive. That way you can pre-empt all the 'will this disk run in my computer?' questions with a simple 'yes'.

The final key is the video card. If you want high end, full-sized GeForce4 cards are no-go thanks to their sheer inconvenient size. GeForce FX with its double height fan, large size and Molex power connector offers the worst of all the worlds for a first timer. The RADEON 9700 also needs separate power, but it is a much more manageable card, but ATI's drivers aren't the easiest to install. Out of all of them, I would probably recommend a GeForce4 Ti4200 with a normal-sized PCB and easy to use detonator drivers. For low end, the same reasoning would lead to GeForce4 MX as the card of choice.

With these recommendations made, you can now sit back and enjoy a few hours reprieve from the first troubleshooting phone call. But it *will* come, and you will inevitably realise that it is easier to just help with the construction. But make sure your computer newbie friends watch your trickery, because it really is as easy as Lego or Scandanavian furniture, and you may well be getting another person hooked on the joy of tinkering. They'll probably curse you for it as money starts being diverted from food and shelter to buy new hardware, but I bet it'll be the last time they call you for help.

ATOMIC BENCHMARKS

At *Atomic,* it is our primary intention to give you the final word on the latest in hardware and PC technology. An integral part of determining the performance of a particular piece of hardware is benchmarking, and this is something that we take very seriously in the *Atomic* Labs.

SYSmark2002

SYSmark2002 is a product of the collaboration between industry group BAPCo (www.bapco.com) and MadOnion.com (www.madonion.com). It is one of the next-generation application benchmarks and is designed to more accurately replicate the day-to-day workload that a system is subjected to. The focus of the benchmark is on Internet Content Creation and Office Productivity tasks, which combine to produce a final performance rating.

Unreal Tournament 2003

UT2K3 is the latest and greatest first person shooter from Epic. The game makes use of the new Unreal Warfare engine, and as such is a perfect benchmark for system performance. We use HardOCP's (www.hardocp.com) benchmarking utility to run a series of flyby benchmarks at varying resolutions to test performance. The utility also features support for a low resolution/high geometry CPU test. Results are in average frames per second.

3DMark2001SE Pro

3DMark2001SE Pro from MadOnion.com is the next progression of the popular benchmark utility. It also uses the MAX-FX engine and heavily emphasises DirectX 8.1 functions, including programmable shaders. The results are not comparable with results from 3DMark2000 Pro.

Serious Sam: SE

Serious Sam: The Second Encounter is used for testing OpenGL performance. For game tests we use the Cooperative demo, which outputs an average framerate trimmed of excessive peaks. It also contains a fillrate test, which outputs fillrates for various texturing methods and is useful for making comparisons between video chipsets.

HSF testing - Chernobyl

To test heatsink fans we use our custom engineered CPU replicator, known as Chernobyl. This beastie pumps a variable wattage through a solid copper CPU die replica, with a temperature probe mounted exactly in the centre of the die replica. Chernobyl results are not directly comparable with real world temperatures, but do provide a very accurate benchmark.

Quake 3: Arena *AtomicMPC* demo

Quake 3: Arena (Q3A), from id Software, is a very popular first person shooter, and represents widely used OpenGL gaming technology. Q3A has a built-in benchmarking utility and built-in demos that can test graphics card performance. These demos are fairly simplistic, so we developed our own *AtomicMPC* demo that pushes the hardware as far as possible.

Other benchmarks

Sometimes we need to break down the tests into more specific areas, such as hard disk performance, memory performance, or a particular facet of 3D, such as T&L. We can draw on a vast number of applications, games and dedicated benchmarks such as CD Speed 99, DisplayMate, Dronez, MDK2, or Adaptec ThreadMark to perform these tests. We also use a Lian Li temperature probe from Anyware (www.anyware.com.au) for tests that involve the measurement of temperatures, such as HDD heatsinks.

Atomic Hot Award

The *Atomic* HOT award is given only to the most kickarse products to hit the labs, ones that score 9 or greater. They're the ones we'd want, or simply the ones we want to make love to.

Atomic testbench specs

Both test systems use Windows XP Professional with Service Pack 1, DirectX 8.1 and the latest chipset and video drivers.

- **AMD Athlon XP 1800+ system – ASUS A7V266-E motherboard (supplied by CASSA:** www.cassa.com.au)
- **Intel Pentium 4 2GHz – ABIT BD7II-RAID motherboard (supplied by ABIT:** www.abit.com.tw)

Common components

- **Samsung 256MB PC2700 DDR-RAM (supplied by CASSA)**
- **Samsung 256MB PC800 RDRAM (supplied by CASSA)**
- **Hercules Prophet II GTS 32MB (supplied by Guillemot:** http://au.hercules.com)
- **64MB Apacer memory keys (supplied by Anyware:** www.anyware.com.au)
- **Hercules Prophet II GTS 32MB (Supplied by Guillemot:** www.hercules.com)
- **Sound Blaster Live! Player (Supplied by Creative Labs Australia:** www.creaf.com)
- **ASUS 52X CD-ROM (supplied by CASSA)**
- **Belkin PCI FireWire card (supplied by Belkin:** www.belkin.com.au)
- **Belkin PCI USB 2.0 card (supplied by Belkin)**

Benchmark settings

3DMark2001SE Pro

- **1,024x768; 16-bit colour; 16-bit textures; 16-bit Z-buffer; triple frame buffer.**
- **1,024x768; 32-bit colour; 32-bit textures; 24-bit Z-buffer; triple frame buffer.**
- **1,600x1,200; 16-bit colour; 16-bit textures; 16-bit Z-buffer; triple frame buffer.**
- **1,600x1,200; 32-bit colour; 32-bit textures; 24-bit Z-buffer; triple frame buffer.**

Quake 3: Arena *AtomicMPC* Demo

All tests use Quake 3: Arena 1.27g and our custom Q3A demo recorded by the *Atomic* staff.

- **CPU testing: 320x240; maximum geometry detail; minimum graphics settings; high sound quality.**
- **Graphics cards: Low quality – 1,024x768; normal quality graphics settings; sound disabled.**
- **Medium – 1,280x1,024; maximum graphics settings; with all game sound disabled.**
- **High – 1,600x1,200; maximum graphics settings; with all game sound disabled.**

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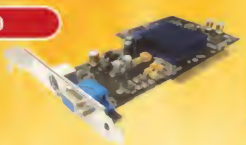
Excalibur Radeon™ 9000PRO VIVO

- 64MB DDR memory
- AGP 4x/2x
- Support Video In, Video Out
- 3D Game (Full Version)

POWERED BY ATi RADEON 9000 PRO

Excalibur Radeon™ 9000

- 64MB DDR memory
- AGP 4x/2x
- TV-out



POWERED BY ATi RADEON 9000

Excalibur Radeon™ 7500

- 64MB/128MB DDR memory
- AGP 4x/2x
- TV-out, DVI, Secondary VGA (optional)

POWERED BY ATi RADEON 7500

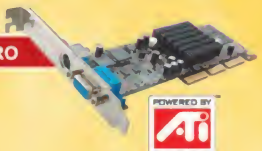
Excalibur Radeon™ 7000

- 32MB/64MB SDR/DDR memory
- AGP 4x/2x bus / PCI bus

POWERED BY ATi RADEON 7000

Excalibur Rage™ 128 PRO

- 32MB SDR memory
- AGP 4x/2x
- TV-out



POWERED BY ATi RAGE 128 PRO

HIS Radeon™ 8500 Editor's Choice HardTECS4U.com Germany April, 2002

HIS Radeon™ 8500 Hardware Recommendation PC-Shopping.de Germany April, 2002

HIS Radeon™ 9000 PRO "Gold" Award PC Format UK August, 2002

HIS Radeon™ 9000 PRO VIVO "Editor's Choice" CD Action Poland October 2002

HIS Radeon™ 9000 PRO VIVO "Best Buy/Good Price" PC Format Poland October 2002

HIS Radeon™ 9000 PRO VIVO Highly Recommended Tom's Hardware Guide Turkey October 2002

HIS Radeon™ 9700 PRO "Good Price & Performance" c't Germany October 2002

HIS Radeon™ 9000 PRO VIVO Editor's Recommendation PC Professionell Germany November, 2002

HIS Radeon™ 9700 PRO "Best Buy" Award Chip Germany November 2002

HIS Radeon™ 9700 PRO "MAX POWER" PC Format Poland November 2002

HIS Radeon™ 9700 PRO "Very Good" Award PC Direkt Germany December 2002

HIS Radeon™ 9700 "Silver Award" Hardware Info Netherlands December 2002

HIS Radeon™ 9700 Highly Recommended Tom's Hardware Guide Turkey December 2002

HIS Radeon™ 9700 PRO Highly Recommended by PC Shopping Germany December 2002

HIS Radeon™ 9700 PRO 2nd Prize of Top 10 PC Shopping Germany December 2002

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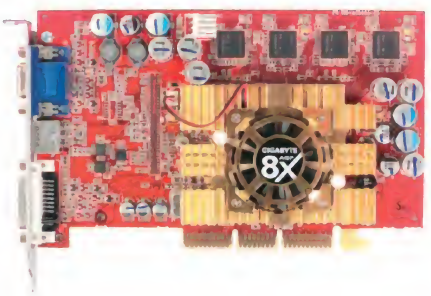
Framerate

Refresh! That's what this month's Framerate is all about folks. Once again, we've got some more Ti cards that have undergone an 8x AGP transformation. As for the 9700, well, it's still there, wearing that oh-so-pretty performance crown. And deservedly so.

Sapphire RADEON 9700

SPECIFICATIONS: ATI RADEON 9700; AGP 8x; TV-out; 128MB DDR-RAM; 256-bit memory bus.
CORE SPEED: 275MHz MEMORY SPEED: 540MHz PRICE: $550
WEBSITE: Sapphire www.sapphiretech.com
SUPPLIER: Achieva www.achieva.com.au

The vanilla RADEON 9700 card has won the hearts and minds of the *Atomic* Labs, short of us ripping our pumping organs from our bodies and soldering them to the raw Silicon. Much cheaper than its PRO sibling, the RADEON 9700 combines bleeding edge performance with a price that is hard to ignore.



Gigabyte Maya II R9500 PRO

SPECIFICATIONS: ATI RADEON 9500 PRO; AGP 8x; TV-out; 128MB DDR-RAM; 128-bit memory bus.
CORE SPEED: 275MHz MEMORY SPEED: 540MHz PRICE: $TBA
WEBSITE: Gigabyte www.gigabyte.com.tw
SUPPLIER: Synnex www.synnex.com.au

For a long while the GeForce4 Ti4200 has ruled the mid-range roost, but the RADEON 9500 PRO brings DirectX 9 compliance and a pile of speed to the arena. A great option for those unable to afford RADEON 9700-level goodness, and are feeling less than inclined to go for the NVIDIA option. We don't blame you.

Albatron Ti4800 SE

SPECIFICATIONS: NVIDIA GeForce4 Ti4800SE GPU; AGP 8x; 128MB DDR-RAM; TV-out.
CORE SPEED: 300MHz MEMORY SPEED: 550MHz PRICE: $TBA
WEBSITE: Albatron www.albatron.com.tw
SUPPLIER: AMI Computer Services www.ami-computers.com.au

Don't let the name fool you. The GeForce4 Ti4800SE GPU is little more than a GeForce4 Ti4600 with slower RAM and AGP 8x. It still performs amazingly, but it is not the step up in speed that the name may suggest. And until the GeForce FX is widely available, this is the latest NVIDIA card on the market.

ABIT Siluro GF4 MX-8X

SPECIFICATIONS: NVIDIA GeForce4 MX 440 with AGP 8x GPU; 64MB DDR-RAM
CORE SPEED: 275MHz MEMORY SPEED: 515MHz PRICE: $TBA
WEBSITE: ABIT www.abit.com.tw
SUPPLIER: Bokerp www.bokerp.com.au

Sitting at the base level now, the GeForce4 MX 440 cannot get near the high end in performance terms, but provides a solid base for a budget machine. If gaming is a secondary concern it is worth looking at the MX 440, which rejoices in great driver support and dependable compatibility.

Leadtek A130 DDR-TH

SPECIFICATIONS: NVIDIA GeForce 4 MX 440 with AGP 8x GPU; 64MB DDR-RAM; ViVo functions
CORE SPEED: 275MHz MEMORY SPEED: 515MHz PRICE: $TBA
WEBSITE: Leadtek www.leadtek.com
SUPPLIER: BCN www.bcn.com.au

Our hot tip is that we will see more cards like this at the low-end. Rather than a focus on blistering games performance, Leadtek has tailored the GeForce4 MX 440 GPU to an audience looking to embark on the world of digital video, with good ViVo functionality helping to raise this card from the pack.

Video cards

The question on everyone's lips is when will ATI's dream run with the RADEON 9700 come to an end? For almost six months now ATI has been the untouchable king of 3D graphics, rendering the once phenomenal GeForce4 Ti4600 to the ranks of average and lifting the 3D bar to new heights.

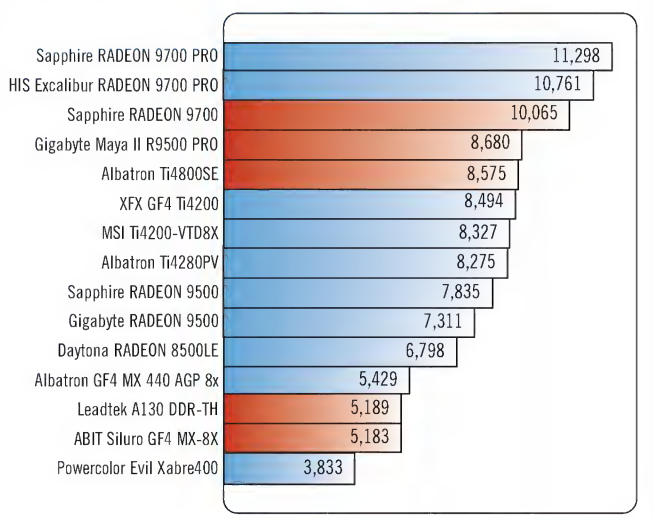
But now the GeForce FX is about to emerge.

Despite early indications that it performs at the same level as the RADEON 9700 PRO, NVIDIA has the brand name advantage and the big legacy of 3dfx to draw upon – something that ATI lacks.

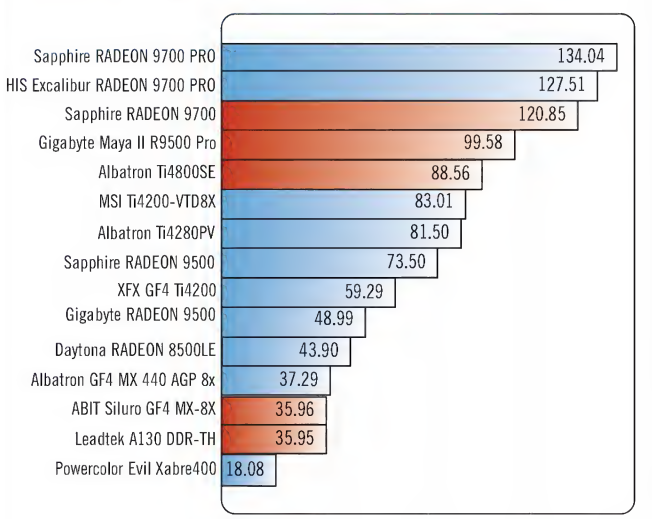
Whatever the outcome of the next few months, it is safe to say that the 3D graphics card industry is again a two horse race, and after seeing what happened last time this occurred the big question on the *Atomic* lips is will NVIDIA be able to shrug off its first significant challenge since 3dfx?

Or will the Curse of Gigapixel strike again and drag NVIDIA down the same path as previous owners of that obscure tile-based rendering technology. Not that there's anything wrong with tile-based rendering. It has a future. Honest.

3DMark2001SE Pro – 1,280 x 1,024



UT2003 – 1,280 x 1,024 high quality



New video cards this month Old video cards

CPUs

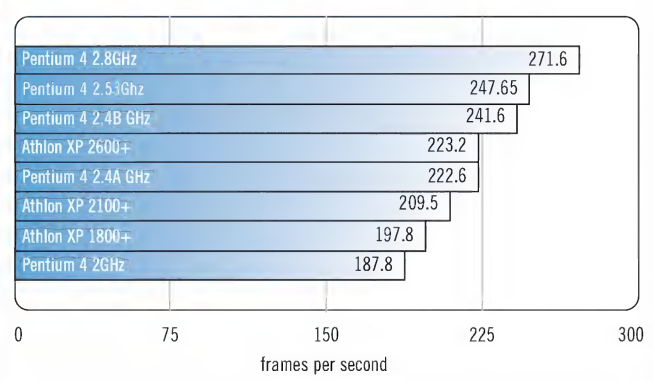
Welcome to the calm before the CPU wars begin, with a renewed fervour not seen since Intel first launched the Pentium 4.

AMD has had its leadup time and in the next few months we will start seeing the mythical Athlon 64 make its way into the market. This really is make or break time for AMD. The new x86-64 architecture is a huge jump and something that Intel is understandably concerned about.

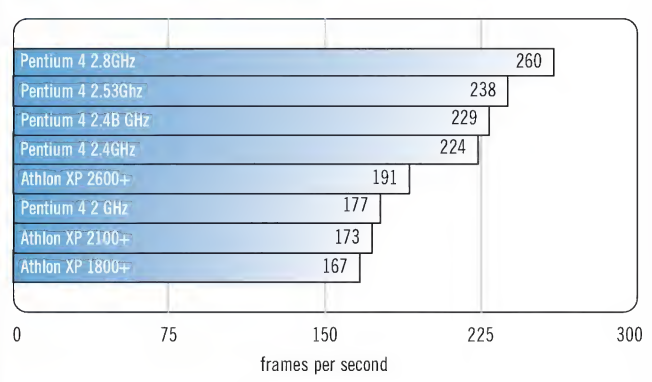
When you keep this at the back of your mind it is unsurprising that Intel is in the middle of a feature ramp-up of the humble Pentium 4. Following on from the introduction of Hyper-Threading late last year, we should see some big things happen to the Pentium 4 as Intel continues to beef it up in the lead up to the launch of the 0.09-micron Prescott-cored CPUs.

It just remains to be seen if 2003 can be as big a shake-up for the CPU market as 2002 was for the video card one. Whatever happens in this exciting year, us end users should be the ones to really reap the benefits – be it from raw speed, raw features, or raw overclocking ala the C1-stepping.

Quake 3: Arena – CPU settings



SYSmark2002 – rating



Thermaltake Aquarius II Liquid Cooling Kit

Bennett Ring mounts one of the first *mass-produced* water cooling kits and chills out.

You know a product is teetering on the verge of the mainstream when companies like Thermaltake release a mass-produced version. And now that we're starting to see all-in-one water cooling kits hitting our CPUs, the art of H20 cooling is finally becoming available to those who don't have an Engineering degree hanging on the wall alongside their Mensa certificate.

The most remarkable feature of this kit has to be its bargain basement price. At a shade under $250, it's the first truly affordable water cooling kit on the market. When you consider that some high end heatsinks sell for around $120, not including the cost of a fan, $250 isn't that much of a stretch for most PC enthusiasts.

The Aquarius II has everything you could possibly need to get your H20 adventure on the road. The radiator is constructed entirely from Copper, which helps to balance out the fact that it's smaller than usual. An 80mm 2,400rpm fan is mounted to this, and provides whisper quiet airflow at a mere 22dBA. The radiator is rated to last for a whopping 50,000 hours, which is approximately five and a half years of continuous use. So by the time this thing finally craps out on you, you'll probably be replacing it with a liquid nitrogen cooling system developed by Boeing, when it enters the CPU cooling market in 2006.

The waterblock is also constructed of Copper, which is very surprising when you factor in the total cost of this kit. At only 260 grams in weight, you're a lot less likely to smoosh your Athlon core with this waterblock than with some of the half kilogram behemoth air coolers. The surface that makes contact with the CPU is very flat, but a little corrosion on the review sample could have benefited from a quick lapping session, which is to be expected from a highly polished Copper surface. Thanks to the inclusion of three different clip types, this waterblock will fit on AMD K7, Intel P4 and even the new K8 CPUs. Mounting for both K8 and P4 chips is very sturdy, as a special metal brace is included that makes use of the four mounting holes around these CPUs, while the K7 clip uses a singular brace that straps onto the standard Socket A mounting lugs.

The 12V water pump pushes through approximately 90 litres per hour, at a pressure of 1.2kg per square centimetre, which isn't very powerful compared to most other pumps. Unlike many pumps in use on water cooling systems, this unit is incredibly quiet, at 20 dBA. A cute little blue LED is nestled away inside the pump, which doubles as the reservoir, helping you to keep an eye on water levels as well as making it a worthy candidate for display through your Perspex window. Unfortunately the pump feels a little dinky, like most of the components in this kit, but it's not as if you'll be subjecting it to the rigors of a triathlon once you've mounted it. Like the radiator, the pump is rated to last for 50,000 hours.

A small reserve water tank is also included that is supposed to be mounted on the rear of your case, just to ensure that the water levels within the system remain high. However, you don't really have to install this if you don't feel the need. All piping is also included, along with lengthy springs which fit inside each pipe, removing the problem of pipe kinks that we've seen in other kits. Heck, there's even a small bottle of concentrated coolant solution to stop the growth of fungus within the water. Nice.

Installation and setup was superbly simple. Thanks to a comprehensive manual that has step-by-step photos of the installation procedure, figuring out which pipes went where was too easy. The inclusion of several high strength magnets is a brilliant idea, as these are used to mount the radiator and pump without the need for any case hacking. And if you happen to have an Aluminium case, you can stick a couple of the provided metal plates to your case interior, onto which you then mount the magnets.

Thermaltake really has thought of every possible configuration that this kit could be mounted in, and has supplied all that you could need regardless of how bizarrely you want to set this up. Of special note were the brilliant hose clips: instead of having to force incredibly tight pipes over large connections, these easy-to-use clips make sure your pipes aren't going to work their way loose. This was tested by yanking on the pipes as hard as we could and they didn't move a millimetre.

We tested on our newly tweaked Chernobyl test rig, which has had a couple of small components adjusted due to some screwy results we recorded with certain high end heatsinks (see *Short Circuits* for more details). This means that the results of the testing aren't comparable with any of our earlier Chernobyl tests. So we retested a Thermalright SLK-800 (one of the finest HSFs known to humanity) with a high speed 80mm Delta fan for the purposes of comparison. Chernobyl was set to pump out 80W, with the AMD CPU replica in place. Ambient temperature was a constant 24°C throughout the testing. The Aquarius II peaked out at a very respectable 53°C at a near silent operating volume, which is the same temperature reached by the Dustbuster of an SLK-800.

While this kit doesn't offer significantly better performance than a high performance air-cooled HSF, it does so at incredibly quiet volumes. And at $250, there simply isn't a cheaper water cooling kit on the market. Well done Thermaltake.

SPECIFICATIONS

Copper water block and radiator; 80mm fan; and 12V water pump/reservoir.

WEBSITE: Thermaltake www.thermaltake.com.tw
SUPPLIER: Anyware www.anyware.com.au
PHONE: Anyware (02) 9879 5788 **PRICE:** $249

9/10

Innovatek AMD Complete Water Cooling Bundle

If you're hardcore about cooling your expensive PC, Bennett Ring has the kit for you.

While the Thermaltake Aquarius II is the poor man's solution to water cooling, the Innovatek kit is the Lotto winner's H20 kit of choice. The Innovatek is also for those who take their PC cooling ultra-seriously (maybe even a little too seriously), and demand the ultimate in construction quality.

From the minute we first opened the box containing the Innovatek kit, we knew we were dealing with the finest in German engineering.

Everything just reeked of class, as opposed to the Aquarius kit which suffered a little from a case of El-cheapoitis. From the Eheim pump, which according to Mr Mansill is a highly-regarded brand among aquarium owners, to the chunky water block, every component inspired confidence that we'd probably die before it did.

However, you pay for this quality – the Innovatek will set you back double the amount of the Aquarius II.

Unlike the Aquarius II's radiator, the one included within this kit is bit of a brick, so you're going to need to do some serious case spring cleaning to squeeze it inside. A 120mm fan is included in the kit to mount onto the radiator, and it's definitely noisier than the 80mm unit found in the Aquarius II kit. However, it's by no means excruciatingly loud, coming in at around the same volume as a stock Intel cooler.

As stated earlier, this kit comes with a hefty pump. It's an Eheim 1046 inline pump, which manages to squirt out approximately 300 litres per hour – over three times the speed of the pump used in the Thermaltake kit.

Unfortunately the benefit of this pump is negated somewhat by the fairly thin diameter of the included PVC piping, which is only 5/16in. The Thermaltake kit also has thin piping, but this isn't so much of a concern due to the fairly slow pump. Still, in this case it's a bit of a disappointment: why bother with such a beefy pump when it's going to get bottlenecked by such thin tubing?

That said, according to Innovatek, it's best to slow down the flow rate of the water through the water block, as it allows the water to 'soak' up more heat as it passes through the block. If you disagree with Innovatek's opinion, replacing the 5/16in piping with larger diameter piping shouldn't be much of a problem, but you will need to purchase new connections to attach these pipes to each component. Something Innovatek would do well to copy from the Aquarius II kit is the use of springs within the piping, as the Innovatek piping is prone to folding. This is a very bad thing if you don't happen to notice it, as it will stop all water circulating within the system. Plastic elbow joints are included for areas of the pipe that are prone to pinching, but overall, it's not as elegant a solution as Thermaltake's.

The hose barbs within this kit are vastly superior to those used in the Aquarius II. Where the majority of the barbs within the Thermaltake are plastic, and thus prone to snapping under extreme conditions, the barbs within the Innovatek are all hardcore metal, so there is absolutely no chance they'll break under strain. Which is a Very Good Thing™ when you're dealing with water inside your electronics-packed PC.

The water block is likewise very hefty, with a large Copper slug forming the majority of the block. The surface of this has been polished so perfectly that it is almost mirror-like, and thanks to some protective covering used during shipping the surface didn't suffer from any of the corrosion found on the Aquarius II. A brilliant clipping mechanism means that the water block is easy to mount perfectly, without any risk of wrecking your precious CPU.

Setting up and installing this kit is quite simple, although we feel the manual could do with more detailed instructions and images to guide total novices through the process. It won't be anywhere near as easy to install as the Aquarius II kit, for a couple of reasons. Firstly the much larger size of the radiator and pump could require a bit of case hacking to fit into your PC. Secondly, there aren't any mounting brackets included with this kit, while the Aquarius II arrives with a variety of different brackets suitable for almost any case configuration you can think of.

Testing conditions for this water-cooled kit were identical to those used for the Aquarius II. After being so impressed with the beautiful build quality of Innovatek's bundle, you can probably imagine how surprised we were to see this kit score identically to the Aquarius II, with a maximum temperature of 53 degrees Celsius. This is the same temperature that the Thermalright SLK-800 reached, albeit without brain rattling sound levels. So it's not quite up there with the Vapochills of the world, but it does offer exceptional cooling at humane sound levels.

If you're after an easy-to-use water cooling kit that you know will last for years to come, and don't mind paying a premium for the privilege, Innovatek's Complete Water Cooling Bundle comes highly recommended; unfortunately a couple of minor complaints and its high price hold it back from beating the remarkable Thermaltake kit.

SPECIFICATIONS

Socket A waterblock; Innovaradi single fan radiator; E1046 pump; and Aluminium reservoir.

WEBSITE: Innovatek www.innovatek.de

SUPPLIER: Cool PC www.coolpc.com.au

PHONE: Cool PC (07) 3879 2255 **PRICE:** $499

8.5/10

Vapochill PE

Deep inside the Fortress of Solitude, John Gillooly unearths the joy of a frozen CPU.

If you're one of the many that cringe at the thought of spending over $100 of your hard-earned dollars on a heatsink fan for your CPU, then prepare to be even more stupefied at the cost for extreme cooling. However, for those who love performance whatever the price, then the Vapochill PE is poised as the solution most likely to have you waking up at night sweating and thinking about wasted gigahertz.

On face value, the Vapochill PE is one of the world's most expensive CPU coolers. There are three major components to the Vapochill PE; a custom-built case made out of galvanised iron; a special circuit board called a ChillControl; and a refrigerator compressor that drives the cooling block that mounts onto the CPU. Unlike the cases with integrated liquid cooling that have passed through the Labs in the past, the Vapochill series of cases focus purely on dropping the CPU temperature to below zero and ignores the other componentry.

It has been over a year since the previous model of Vapochill was tested in the *Atomic* Labs. Since then, there have been some significant changes in the design and efficiency of the Vapochill cases, all for the better: the case is a work of industrial art.

Rather than go for fancy Aluminium designs, or taking the pre-modded route, designer Asetek has instead created a big, solid, simple beast. It is made out of galvanised iron, largely to provide the strength needed for the top-mounted compressor unit. It happily fits even the bigger ATX motherboard, and can cope easily with those pesky full length GeForce4 Ti4600 video cards that have been a pain in the arse for anyone with a fiddly case. There are five internal 3.5in drive bays, one 3.5in bay designed to accommodate a floppy drive and three 5.25in drive bays. The power supply mounts on its side over the cooling block, which allows the top section to be purely dedicated to housing the compressor.

All internal edges are nicely rolled and the whole case gives off an aura of being able to survive a nuclear holocaust intact. The final part of the internal layout is a simple removable motherboard tray, which is incredibly useful for getting access to the motherboard so you can prepare your CPU for the sub-zero temperatures that it is about to encounter.

Sitting above the circuitry is a 12V Danfoss compressor, which is the main differentiator between the standard Vapochill SE model and the high end Vapochill PE model that we have tested. This compressor is designed to keep a CPU at -15 Celsius under load and -25 Celsius when idle. This drives a cooling block that mounts to the CPU socket using different methods for Socket A and Socket 478 CPUs – we looked at both kit types.

Mounting the cooling block takes some preparation (all logically explained in the manual) to avoid the terrifying concept of condensation collecting and shorting out your expensive system. This largely revolves around smearing thermal conduction compound over anything metallic on the CPU and socket, packing the inside of the socket with foam rubber and then attaching a small heater over the pins of the CPU to stop them from freezing when the cooling block is working. The process is relatively simple, and apart from a tendency to end the process with hands smeared in nicely toxic thermal goop, it could even be called *fun*.

Interfacing between the case and the cooling is the brain of the Vapochill, the ChillControl. This unit is programmable via a bootable floppy disk and a serial connection and handles heat monitoring and management functions for the case. It also intercepts the main power supply to the motherboard, not allowing the system to boot until the compressor is up to speed and down to -5 degrees Celsius. This reduces any concerns about thermal damage being done to the CPU while the cooling system gets up to speed.

Our testing of the Vapochill unit shows that it happily lives up to the temperature claims made about it (of course the sealing of the CPU socket means that under-CPU temperature probes will be completely useless). Our Athlon XP 1800+ CPUs have the overclocking headroom of a small piece of damp newspaper, so we turned to the hallowed *Atomic* 1.6A GHz Northwood Pentium 4. We already had the 1.6A running stable and happy at 2.4GHz with air cooling, but here was our chance to get that 1GHz overclock out of it.

After preparing the socket and firing the Vapochill PE up we managed to get the 1.6A running rock solid at 2.66GHz, running on a 166MHz FSB. With the appearance of the new C1-stepping Pentium 4s, the chance of getting similar monstrous overclocks is fairly high and the Vapochill PE is the perfect complement.

In the end, performance is going to depend on both the motherboard you use and the luck you have finding an overclockable CPU. But with the Vapochill you can rest assured that when you do find these things, it will give some of the best possible cooling performance and allow you to squeeze more out of your processor than any other desktop cooling solution on the market today. There are currently no Australian distributors for the Vapochill case, but they are available online and from some specialty case modding stores.

Asetek has really scored well with the Vapochill PE. Despite price drops from the previous generation it is still a very expensive option for cooling. But if you have a love of overclocking and an attention span longer than the 10 minutes of freakish performance that liquid nitrogen gives then the Vapochill is a saviour.

SPECIFICATIONS

Full-sized ATX case; 12V Danfoss compressor; custom ChillControl unit; and CPU-specific mounting kit.

WEBSITE: Asetek www.asetek.com

SUPPLIER: Asetek www.asetek.com

PHONE: N/A **PRICE:** approx $1,300 inc. freight

9/10

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Intel C1 Pentium 4 and 2GHz Celeron

Bennett Ring has chipped away and uncovered a couple of overclocking gems.

While AMD's CPUs continue to plummet further into the realm of unoverclockability (yes, that is a word), Intel's CPUs march ever-towards tweaking nirvana. Two new CPUs from Intel, the 2GHz Celeron and the C1-stepping Pentium 4, are shattering the notion that we shouldn't expect much of an overclock from today's 2GHz+ CPUs.

The C1-stepping of the Pentium 4 has been setting the world's overclocking forums on fire, yet only those who understand what a CPU stepping is know what to look for. A stepping is basically a revision of a CPU, with changes to the mask that is used in the process of creating the processor. The C1-stepping uses an entirely new mask, which means that it's a major revision to the Pentium 4, and it just happens to be an extremely sweet overclocker. This doesn't mean that the C1 is a whole new chip – it's just a P4 that has undergone a bit of a facelift.

With a little motherboard voltage modding and some extreme cooling, many people have reported overclocking the 3.06GHz C1 Pentium 4 up to a whopping 4GHz and beyond. For the sane rest of us, to whom the idea of pouring liquid nitrogen into a brass cup over the CPU seems a little, well, insane, not to mention impractical, the lower speed 2.2AGHz C1 and above CPUs have been averaging a maximum speed of between 3GHz and 3.5GHz. That's a massive overclock of around 1GHz with standard air cooling – provided you can get your hands on a lower-speed C1, which is rarer than a hot chick at a Counter-Strike LAN.

Check out the C1 table at www.overclockers.com to identify if the P4 you're about to purchase is actually of the C1 variety. An easier way to tell is to check the core voltage of the CPU: if your new P4 defaults to 1.525 volts, you've scored yourself one hell of an overclocker.

We managed to get our mitts on a 2.4B GHz C1 – unfortunately we couldn't find a C1 with a 100MHz frontside bus. Which is a pity, as the final overclock we managed to squeeze out of this chip could possibly have been limited by the maximum frontside bus speed of the motherboard we tested it in. So just how much free speed did we manage to wring out of the 2.4B GHz?

We tested using an ABIT BG7 i845G-based motherboard, with some scrumptious Corsair XMS3500 DDR-RAM (scrumptious due to its max speed of 400MHz).

A RADEON 9700 PRO was also used to limit bottlenecking in the graphics card department. After a mere 15 minutes of tweaking we managed to get the chip to run at 2.91GHz, with a front side bus of 162MHz (with a locked multiplier of 18x). Voltage was increased to 1.7V to get it to run stably, which is about as high as you want to go in the juice department without extreme cooling on a 0.13-micron Pentium 4. While it wasn't quite as high as expected, a free 500MHz is still a 20% overclock. Thanks Intel.

As a result of this overclock, we managed to increase the score in the UT2003 CPU test (the Inferno DM map running at 640 x 480) from 201 frames per second up to 240 frames per second – a speed increase of almost exactly 20%. SiSoft Sandra CPU test scores also increased by almost exactly 20%, with a Dhrystone ALU score of 7475MIPS, and a Whetstone FPU/iSSE2 score of 1705/3903MFLOPS. Not bad for a $400 CPU running at the same speed as a CPU that will set you back at least $1,000 (www.pricewatch.com.au).

If you thought that was a nice overclock, just wait till you see what we managed to push the 2GHz Celeron to.

How does a free 800MHz sound to you? Yeah, we thought a 40% speed increase was quite impressive too.

Thanks to its default 100MHz front side bus, we only needed to increase the front side bus up to 140MHz, well within the range that the BG7 motherboard is capable of. However, the lack of cache still hobbles the Celeron, even when it's running within a mosquito's pecker of 3GHz. In case you'd forgotten, the Celeron has a meager 128KB of L2 cache, a quarter of the 512KB on the full-blooded Pentium 4. This has a tremendous impact on the CPU's performance, as instructions need to be fetched from the main system memory more often to keep the cache filled with relevant data. As a result, the 2.8GHz can't really compete with equivalently priced AMD CPUs, with the closest in price being the Athlon XP 2000+.

Unfortunately we didn't have a 2000+ for comparison, so we squared it off against the Athlon XP 1800+, which is around $40 cheaper than the Celeron. Even though the AMD chip is clocked at a meager 1.53GHz, it still stomped over the Celeron, with a UT2003 CPU result of 182 frames per second, as compared to the Celeron's score of 105 frames per second. Even when the Celeron was cranked up to 2.8GHz, it only managed to reach 151 frames per second, which is still inferior to the Athlon XP 1800+. So while the Celeron is great at overclocking, it still can't keep up with the equivalently-priced AMD CPU.

It's amazing how much the tables have turned over the last 18 months or so. While it's increasingly difficult to get anything free out of AMD's Athlon, the reverse has occurred with Intel chips. Despite offering up to 40% extra performance free the new Celeron is still a crippled chip, so it's the C1 Pentium 4s that keen overclockers should keep their eyes peeled for.

SPECIFICATIONS

Celeron 2GHz; 100MHz FSB; 20x multiplier; 128KB L2 cache.C1 Pentium 4; 0.13-micron; 1.525V; 512KB L2 cache.

WEBSITE: Intel www.intel.com

SUPPLIER: Intel www.intel.com

PHONE: Intel (02) 9937 5800 **PRICE:** Celeron – $180; C1 P4 – $400

AMD Athlon PROCESSOR XP

XGP

MMD Computers "X Gamer Pro"
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Microsoft Windows xp Professional

System Specification & Technical Reference

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CPU, Chipset, Video, HDD Water Blocks
300 Watt PSU Continuous @ 36 amps
2 X Antec Blue LED 80mm Sensor Case Fans

AMD Athlon™ XP processor 2400+
Asus AV78X – Motherboard
Corsair XMS 3500 DDR CAS-2
Hercules 9700 Pro 128Meg 8X AGP
Digital 5.1 - S/PDIF in/out Interface

2 X Western Digital 100 Gig JB HDD's
(200 Gig Striped Serial ATA Interface)
Samsung 1.44 Meg Floppy Drive
Sony 16X DVD Rom Drive
Ricoh MP 5125A DVD+R/+RW

Hitachi 17" CM 621 Flat CRT Screen
Logitech Wireless Keyboard & Mouse
Hercules 510 – 4 X Satellite + 1 X SUB
Microsoft® Windows® XP Professional

System comes with onsite installation and 1 hours training courtesy of "Quick Knowledge".

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P5 Glove

The P5 glove can make even the weediest geek look like a T-800 Terminator, or for those with a horror movie fetish, Freddy Krueger. Promising to allow you to control your games with a simple flick of the wrist; can the P5 finally prove that hand gesture control devices don't have to totally bite the big one?

Unfortunately not. Biting harder than a starving pit bull that has just been thrown a raw Siamese steak, the P5 has a couple of nice features but is ultimately let down by a huge flaw. It certainly looks the part, and is comfortable enough that you'll soon forget that you're now equipped with the hand of a cyborg.

Unfortunately, left-handed freaks are going to have to learn to be like the rest of us if they want to use the P5, as there is no way to fit the P5 to your left hand.

When wearing the glove, each finger is assigned to whatever button press you desire, and this feature works perfectly. Simply squeeze each finger, and it is registered as a button press immediately. It was quite novel playing the included demo of Beachhead 2002 and squeezing our trigger finger to fire the machine gun. It might even have been fun, if only we could have actually aimed where we were firing.

Now for the big flaw: this device uses line-of-sight optical IR tracking to measure the position of the glove in 3D space, along six different axes (yaw, pitch, roll, x, y and z). This is all recorded by the big monolith looking contraption, which you put next to your monitor. Unfortunately, this is woefully inaccurate.

Even when just moving the mouse pointer across the Window desktop, the P5 was a totally shocking replacement for the humble mouse. More often than not we couldn't even get the pointer to move, requiring much frantic waving of the glove in front of the receiver before it would start to move. And even when it did work, which wasn't often, after approximately 17 seconds of P5 action our skeletal, geek arms began to tire from the strain of being suspended mid air in front of the monitor.

If you feel like wasting several hundred bucks on something that looks cool but doesn't work, feel free to purchase the P5. The rest of us will use it for some other upgrade.

SPECIFICATIONS

Five independent finger measurements; optical tracking system with three-four foot range from receptor; USB 1.1.
WEBSITE: Essential Reality www.essentialreality.com
SUPPLIER: Phrixus www.phrixus.com
PHONE: Phrixus (02) 9980 2587 **PRICE:** $349

3/10

Cambridge Megaworks THX 5.1 550

When you start looking at $900 computer speakers you realise a few home truths. Unlike the cheaper speakers there are very few bad quality sets in this price range, but there are a couple of sheer standout ones.

Creative's entry in this segment is the Cambridge Megaworks THX 5.1 550 speaker set, comprising five satellites, a subwoofer and a wired remote control.

In keeping with the growing focus on the computer as a home entertainment hub, the Megaworks 550 proudly asserts its THX certification and aims itself at those who want to use their PC for DVDs and music.

Unlike other sets, it lacks any sort of built in Dolby decoding, Creative instead recommending the set be paired with an Audigy-level card, which supports analog output of 5.1 audio.

We gave the speakers a workout not only with the Audigy but also with the integrated 5.1 sound on a nFOrce2 motherboard. While we would not recommend running speakers of this quality using integrated audio, the nForce2 is an exception, pumping out sound of a remarkably high standard.

Sound quality in games, music and DVDs was highly impressive with the Megaworks 550, with a good frequency range and relatively good bass for a set of computer speakers.

Although we wouldn't choose to run our home theatre system with it, it's one of the finest sets of computer speakers we have experienced to date. It isn't quite at the same ridiculously good level as the standout Klipsch 5.1 offerings but it's fairly close and will not disappoint.

The only major complaint we have about the system is the use of a wired remote, which is fine when sitting at your desk but cumbersome when you want to relax and watch a DVD.

Your average punter is not even going to consider speakers of this quality for their computer, but what better way to complement a heftily specced up system than by overdosing on the audio quality? One of the best sets of computer speakers out there – with a price to match.

SPECIFICATIONS

5.1 THX certified 5.1 surround system; wired remote control; 8in wooden subwoofer; and five satellite speakers.
WEBSITE: Creative australia.creative.com
SUPPLIER: Creative australia.creative.com
PHONE: Creative (02) 9666 6100 **PRICE:** $899

9/10

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PC PowerPlay

"A stunner. All aluminium and built to withstand a direct nuclear strike in the megaton range. As we have mentioned more than once, we even dropped this case down a flight of concrete steps and it barely flinched. Ten bays keep everything snug, three extra fans keep it cool, and slide-off covers and a motherboard tray mean it's ready for upgrade action any time".

atomic MAXIMUM POWER COMPUTING

"Undoubtedly the parent of the Aluminium case craze, Lian Li has been incredibly successful in changing the case buying mindset."

See detailed reviews (search "Lian Li") at
www.dansdata.com
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Aluminium Tower Cases

Common features
- Silver hard anodized aluminium midi case.
- Removeable mainboard tray.
- 12 total device bays, 4x5.25", 3x3.5" ,5x3.5" hidden for HDD.
- 2x8cm ball bearing & 2x8cm sleeve bearing case fans.
- 2 x front USB2.0 ports

PC-6087A
Green acrylic door $439.00 RRP

PC-6089A
Blue acrylic door $439.00 RRP

PC-39A
Silver hard anodized aluminium mini case with bulit-in 2 mobile racks. 8 total device bays 2x5.25", 1x3.5", 3x3.5" hidden for HDD. 2 x ATA133 lockable mobile racks. 2 x 8cm sleeve bearing case fans. 2 x front USB ports
$425.00 RRP

Common features
- Hard anodized aluminium midi case.
- Removeable mainboard tray.
- 12 total device bays, 4 x 5.25", 3 x 3.5", 5x3.5" hidden for HDD.
- 4x8cm sleeve bearing case fans. 2 x front USB ports

PC-60USB (Silver)
$299.00 RRP

PC-65USB
(Silver transparent panel)
$369.00 RRP

PC-61USB (Black)
$340.00 RRP

Common features
- 12 total device bays, 4 x 5.25", 2 x3.5", 5x3.5" hidden for HDD.
- 3 x 8cm sleeve bearing case fans.
- 2 x front USB ports

PC-7 (Black)
Full aluminium anodised black midi case
$260.00 RRP

PC-5 (Beige)
Economy beige aluminium midi case with plastic front
$190.00 RRP

Common features
- Hard anodized aluminium full tower case
- 15 total device bays, 6x5.25", 3x3.5", 6x3.5"
- hidden for HDD. 4x8cm ball bearing case fans.
- 4 x front port USB extender panel

PC-70USB (Silver)
$499.00 RRP

PC-71USB (Black)
$539.00 RRP

PC-30
Silver mini tower full aluminium anodised. Sliding tray for ATX motherboard. 2 Fans. Total 7 bays 2x5.25", 2 x 3.5", 2 x 3.5 hidden
$260.00 RRP

Home Theatre Cases

PC-9300
Silver hard anodized aluminium desktop case. Total 4 drive bays. 2x5.25", 2x3.5" internal bays. 2 sleeve bearing fans. Suitable for Micro ATX M/B. 2 x front USB2.0 ports. Requires micro ATX PSU
$299.00 RRP

All cases come without power supplies

Case Accessories

EX-10
Aluminium front panel I/O adaptor. Allow easy front access to all PC ports. $80.00 RRP

PC-T4

PC-T4B

PC-T4
Silver LCD Dual Thermometer to fit 5.25" bay $59.00 RRP

PC-T4B
Black LCD Dual Thermometer to fit 5.25" bay $59.00 RRP

PC-T3
Silver LCD Dual Thermometer to fit 3.5" bay $59.00 RRP

PC-T3B
Black LCD Dual Thermometer to fit 3.5" bay $59.00 RRP

Panel-75

Panel-65
Left side window panel for PC-60USB Case
$70.00 RRP

Panel-75
Left side window panel for PC-70USB Case
$105.00 RRP

Panel-75B

Panel-65B
Black Left side window panel for PC-61USB Case
$75.00 RRP

Panel-75B
Black Left side window panel for PC-71USB Case
$115.00 RRP

MF-20
Aluminium extension mounting kit for 2 x 3.5" Drives. Attaches under your existing HDD bay
$16.00 RRP

MF-30
Aluminium extension mounting kit for 3 x 3.5" Drives. Attaches under your existing HDD bay
$19.00 RRP

MF-30

PC-M2

PC-M2B

PC-M2
Lian-Li silver hard anodized aluminium mouse mat
$15.00 RRP

PC-M2B
Lian-Li black hard anodized aluminium mouse mat
$15.00 RRP

EX-12
Lian-Li SCA-2 Hot Swap bay supports 3 Ultra-160 80 pin SCA drives $245.00 RRP

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PC-C8	For LG CRD-8484B	$12.90 RRP
PC-C10	For Aopen DVD-1648	$12.90 RRP
PC-C12	For Asus CD-S520A	$12.90 RRP
PC-C14	For Aopen 952E/AKH	$12.90 RRP
PC-F7	3.5" Teac/Mitsumi floppy disk drive	$9.90 RRP

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Shuttle XPC SN41G2

John Gillooly attains nirvana in a shoebox. A heavenly shoebox.

Sexy little silver shoeboxes like the Shuttle XPC are set to become a major part of the computing landscape over the course of the year. Many manufacturers are now entering the niche carved out by Shuttle, because they can see big things in these small packages. But competing units are many months away, and Shuttle is without question the king of the small form factor.

As a concept and product line, the XPC came a long way in 2002. The first models we used in the *Atomic* Labs were relatively underpowered, suffering from a lack of an AGP slot and poor support for cutting edge CPUs.

Two major changes in 2002 attacked these problems, and the models now use the latest chipsets to provide expandability and support for new processors.

All this development has culminated in the launch of the SN41G2 XPC system. By using NVIDIA's nForce2 chipset, Shuttle has loaded an insane number of features into the box, while maintaining blistering performance and flexibility. Rather than the ordinary integrated graphics and sub-par AC '97 sound, the XPC SN41G2 features an integrated GeForce4 MX420 level graphics controller and the Dolby Certified 5.1 Surround Audio Processing Unit that was a standout feature of both generations of the nForce chipset.

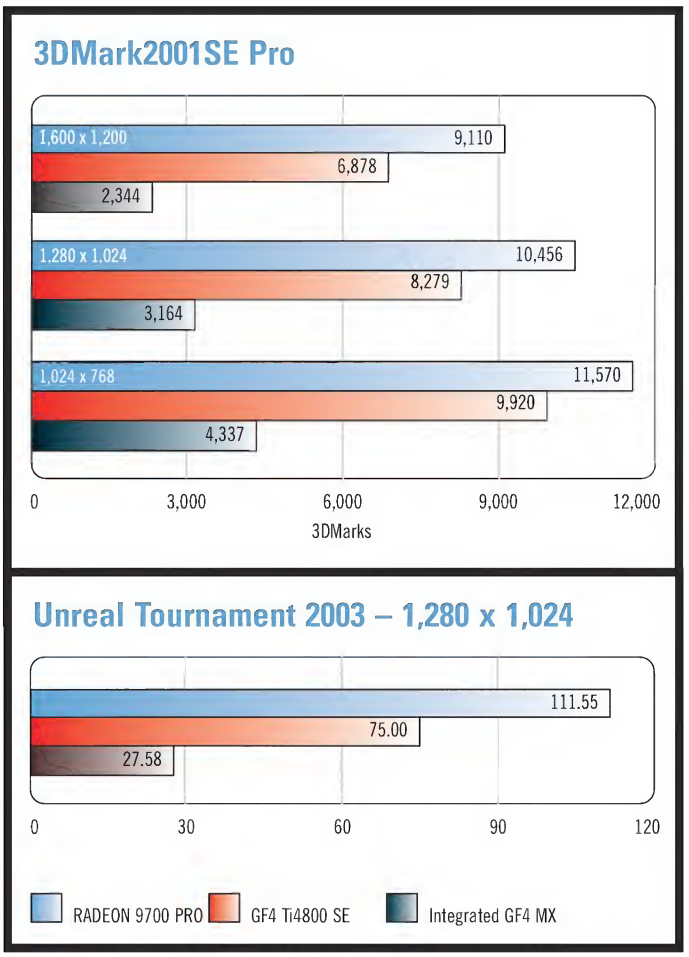
The XPC SN41G2's back panel highlights the power and flexibility of the unit: dual-VGA outputs, S-Video TV-out, IEEE 1394 and USB 2.0 ports alongside familiar serial, PS/2 and audio ports. The front has IEEE 1394 and USB 2.0 ports too, but adss S/PDIF optical audio-out, headphone and mic jacks.

In order to get the notoriously-hot Athlon XP CPUs to work in the cramped confines of the XPC, Shuttle uses a Socket A-specific variant of the ICE heatpipe cooler seen on other models of XPC. This cooler consists of a block with embedded heatpipes that mounts on the CPU and runs up to a fan-cooled radiator at the back. The heat output of the nForce2 IGP chip means that it also uses an actively-cooled heatsink within the case.

We tested the XPC using our Athlon XP 1800+ CPU and two sticks of Corsair XMS3200 running in dual-channel mode. Our first tests used the integrated GeForce4 MX GPU, while the other two used separate graphics cards running in the AGP slot of the unit.

In the past we've had concerns with video cards overheating when crammed up against the side wall of the case, so we ensured the unit was properly assembled and sealed up before testing. One unfortunate issue we did come across while testing was that the nForce2 can be extremely sensitive to different brands of RAM.

The no-name RAM we initially tried caused the system to become incredibly unstable, flaking out whenever under load. After we switched to the Corsair RAM the problems disappeared.



Luckily, if you surf to www.nvidia.com and look for nForce2 you will find a list of compatible RAM modules. After the benchmarking and the looped runs of the 3DMark2001SE Pro demo, we were happy to report no problems with heat.

The benchmarks demonstrated a huge performance disparity between using a dedicated video card and integrated graphics, but the integrated GeForce4 MX420-level graphics allow the unit to deliver respectable 3D performance if needed. The big plus is that high-end video cards like the RADEON 9700 PRO will easily fit into the unit and even the ridiculously large PCBs used on the high-end GeForce4 cards can be accommodated by the unit with some deft manoeuvring of cables.

Pairing the ever more impressive XPC line with the powerful nForce2 chipset seems to be the perfect marriage. With the SN41G2, Shuttle has reached an impressive milestone, delivering a unit that combines power, performance and features in one astonishing little package.

SPECIFICATIONS

Shuttle FN41 motherboard with NVIDIA nForce2 IGP and MCP-T; Aluminium barebones chassis; Dolby 5.1 sound.

WEBSITE: Shuttle www.shuttle.com

SUPPLIER: Sato Technology www.satotech.com.au

PHONE: Sato Technology (03) 9899 6333 **PRICE:** $880

9.5/10

Albatron

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The world first FSB800MHz Mainboard Coming soon!

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Albatron PX845PEV P.	DDR439	FSB667
Asus P4PE	DDR421	FSB650
Gigabyte 8PE667 Ultra	DDR415	FSB653

In AnandTech's recent 845PE shootout, the **Albatron PX845PEV Pro** was the highest performing overclocker compared to ASUS and Gigabyte.

*Data provided by ANANDTECH

atomic HOT

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PX845PEV Pro Intel® 845 PE / ICH

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Overclocking to DDR439: "Very impressive numbers"-AnandTech

- Intel® 845PE/ICH4 chipset
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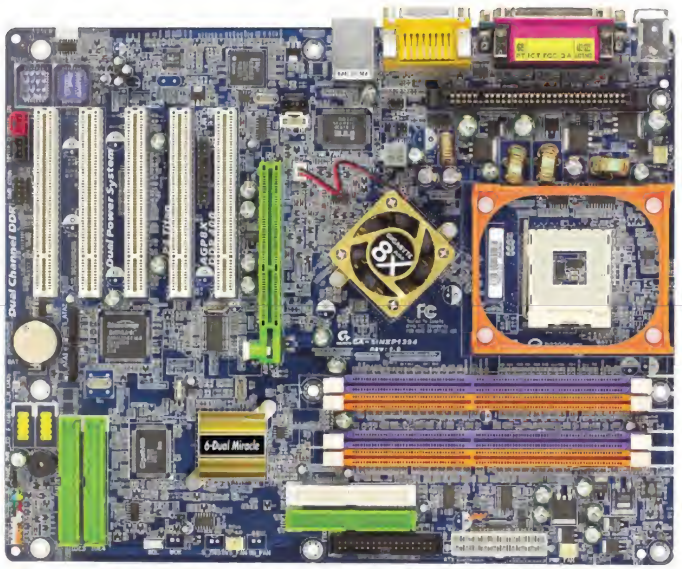
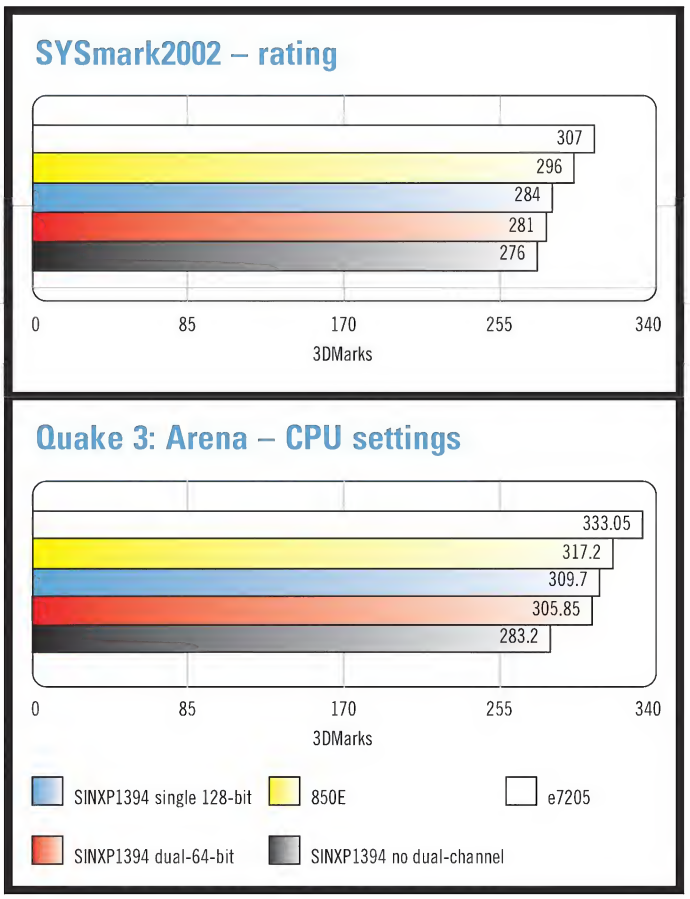
Soar to Success

Gigabyte SINXP1394

John Gillooly goes double or nothing with SiS' dual-channel chipset.





Ever since the first clock signals started running through motherboards, there has been a delicate dance to ensure bandwidth equality throughout the PC. Advances in frontside bus speeds lead to a deficit of memory bandwidth, and upping memory bandwidth usually led to bottlenecking by the CPU. Considering the current generation of DDR-RAM will never make equity with the Pentium 4's 533MHz frontside bus speed, the powers that be decided to go down the dual-channel DDR path to get the memory bandwidth up to 'speed' with the CPU.

While Intel settled on dual-DDR266 to match the 533MHz FSB of the Pentium 4, SiS is typically making a chipset with ample memory bandwidth for future developments. Like most of these new generation chipsets, the SiS655 is targeted at use with DDR333, but it will function with the problematic DDR400 memory also. We won't really see a need for DDR400 until JEDEC ratifies it as a standard and Intel pumps the Pentium 4's FSB up to 800MHz – rumoured to happen in a few months.

Gigabyte has taken this SiS655 chipset and its dual-DDR333 support and packaged it into the GA-SINXP1394 motherboard. Dual-DDR is currently aimed at the high-end user and Gigabyte has tailored the board precisely for this use. On top of the AGP 8x, USB 2.0, IEEE 1394 and six-channel audio provided by the SiS chipset, the board also has Gigabyte's new dual-power system, SATA and Parallel ATA RAID via separate controllers, external SATA back plate and Gigabit Ethernet to make for more features than you could feasibly need.

We've found that SiS products can get stroppy when pushed. Thankfully, during our testing we found this to be one of the most stable SiS chipsets we have encountered. Bear in mind, we only tested the board with DDR333, as DDR400 is still a minefield of partial standards and potentially crippling instabilities.

Unlike Intel's e7205 chipset, the SiS655 offers several options for memory controller configuration rather than a simple on or off. If you are only using a single stick of RAM, or three unmatched sticks, then the dual-channel memory controller is turned off. However, if you're running two sticks of RAM you can choose between two 64-bit memory controllers or a single combined 128-bit controller. These choices, thankfully, are explained in the manual for the GA-SINXP1394.

We tested the board against the Gigabyte GA-8INXP, which uses the Intel e7205 chipset, and an Intel 850E RDRAM-based motherboard. Testing was done with a 3.06GHz Pentium 4 (with Hyper-Threading disabled) and 1GB of PC3200 Corsair DDR-RAM (and 1GB PC1066 RDRAM for the i850E).

If we look first at the bandwidth sensitive Quake 3: Arena results we see a definite pattern emerging. The simple switch to dual-channel DDR-RAM gives the SINXP1394 a performance boost in the order of ten percent; however the quicker dual-64-bit controller configuration still falls behind the Intel offerings.

A similar picture is shown in SYSmark2002, however the dual-64-bit configuration is still the fastest option on the SINXP1394.

Gigabyte has once again delivered. The SINXP1394 is loaded with an almost obscene number of features, has surprisingly stable performance for a SiS chipset, and it can perform almost at the level of an 850E with PC1066 RDRAM. This is a perfectly capable solution from Gigabyte – just not outstanding.

SPECIFICATIONS

SiS655 chipset; dual-channel DDR333/400 support; AGP 8x, USB 2.0; IEEE 1394; SATA; RAID; Gigabit Ethernet.

WEBSITE: Gigabyte www.gigabyte.com.tw
SUPPLIER: Synnex www.synnex.com.au
PHONE: Synnex 1300 880 038 **PRICE:** TBC

8.5/10

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I GAMES I

XBOX LIVE – THE TECHIE BITS.

BENNETT RING DELVES INTO THE REVOLUTIONARY TECHNOLOGY THAT DRIVES XBOX LIVE AND EXPLAINS THE REALITY BEHIND A FEW RUMOURS.

You've read our glowing report on *page 40* detailing our experience of playing Xbox Live (XBL) in Australia. This feature focused on the hands-on experience of XBL, but we also managed to get some juicy behind-the-scenes tech details at the recent Australian Game Developers Conference, courtesy of Pete Isensee, lead developer for Microsoft's Xbox Advanced Technology Group.

According to Pete, one of the main focuses of XBL is not just great gameplay, but the building of a sense of community. We figure it's not out of the goodness of its heart that MS wants XBL gamers to feel as if they're part of one big happy family. Instead, it's probably because those who feel as if they're part of a tight nit community are likely to spend more to remain a part of it. This is why the Friend lists, statistics tracking and Opti-matching are very important components to Live.

Thankfully, developers don't have to create code for any of these features. MS has been good enough to produce little nuggets of code that can be integrated within days into any game to enables these features, meaning game developers have no excuse for not incorporating them.. This is a bonus to gamers too, as we can expect very similar interfaces for these features across all games. In fact, MS has specified standar icons for use across all games, making it even easier to figure out what your pals are up to, regardless of which game you're playing.

However, there is currently a little variance in the way the Friends options work, with some games having a much more thorough Friends interface than others. We're sure MS will revamp the Friends code so these features are available in all games, and thanks to the ability to patch XBL titles, all games should get an enhanced Friends interface.

Security is of paramount importance to XBL for two reasons. Firstly, considering that every Live user has to enter credit card details to activate the service, the potential for hackers to make some serious cash by exploiting this is very real. And if this did occur, it could destroy Live, as consumers wouldn't trust the service with their credit card details and wouldn't sign up for it. Secondly, and something we greatly appreciate, is that MS doesn't want Live ruined by cheating. This is one of the main reasons MS won't allow modded Xboxes to connect to XBL, as these could provide a weak link in the security chain that would allow cheaters to introduce exploits. So when you try to connect to XBL, your Xbox is first scanned for any modifications. If it finds any, you can kiss XBL goodbye.

As new modifications are developed to try to counter this, MS will add these to the scanning routine, making it impossible for modded Xboxes to connect to XBL. This could be one of the greatest strengths of XBL over the cheat-ridden realm of PC online gaming.

All packets sent between Xboxes are encrypted using 'military grade' encryption – according to MS. You would expect this high level of encryption to chew through your CPU resources and thus cause each game to slow to a crawl. However, MS claims the secure encryption and decryption requires a meagre one percent or less of CPU resources, which is incredibly efficient considering how strong the encryption code is.

One of the most revolutionary features of XBL is the inclusion of voice communications for all Live titles. While MS claims telephone quality or better, we'd have to say that it was only as good as telephone, which is still remarkably good. And it's quite possible that once the service hits Australia, and we don't have to deal with international latency, that the voice quality will reach the advertised level. Each voice stream uses a hefty 3.2KBs, which is about the same bandwidth that a single 33Kb/s modem can handle. No wonder XBL is broadband only, eh? Just like the security decryption code, the CPU overhead for encoding the voice comms is incredibly efficient – a mere one percent for encoding and 0.4 percent for decoding (per stream). However, unlike the rest of the packets sent over the Live network, voice packets are not securely encrypted, due to legal issues in the States. In other words, the US spooks still want to be able to eavesdrop on conversations on Live. Don't you just love fake democratic nations?

When network conditions are ideal, the minimum latency between speaking and being heard by other XBL players is a tiny 120ms, which is an almost undetectable delay. This is much better than current PC-based voice comms, which seem to have a much higher latency of around 500ms or greater.

The final revolutionary feature of XBL (revolutionary for a console at least) is the content download functionality, which allows you to download extra content such as new levels, characters and even game modes at the click of a button.

At the moment Splinter Cell and MechAssault have free additional content waiting to be downloaded, but chances are that other games will require a fee paid to download new content. Just like the Friends features, the code for downloadable content is prewritten by MS, allowing developers to drop this feature into games simply and quickly.

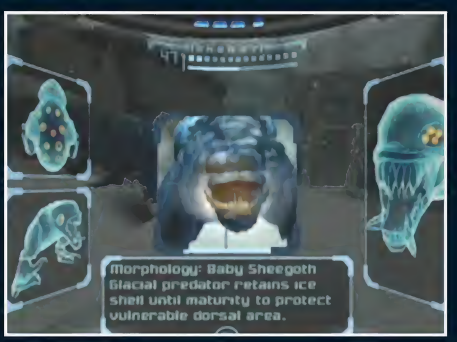
So there you have it. Behind the joy that is XBL is some very serious, not to mention clever, technology that drives the whole service. Let's just hope that some 16-year-old hacker with no life and a serious grudge against all gamer-kind doesn't manage to find a way around the extensive security features that Microsoft has implemented.

Metroid Prime

John Gillooly's shaking after a visit from the Ghost of Platformers Past.

ABOVE: Close-up viewin the HUD's combat mode of one of the gorgeous landscapes of Talon IV.

ABOVE: Slaughter this beast before it has your brains for dinner: faster Samus, kill kill kill!



ABOVE: A baby Sheegoth morphing into its pasty-faced Sisters of Mercy-loving pubescence

Nearly every Nintendo fan has been whipped into a frenzy of excitement at the return of Samus Aran, hero of the Metroid games, who has made the transition to 3D with Retro Studios' Metroid Prime. Moving from a 2D platformer to a fusion of first person shooter and 3D platform adventure has been a massive gamble for Retro and Nintendo, and few people would argue that the transformation has been anything but a success. However, the problems with Metroid lie not with the new style but the underlying gameplay mechanics.

As Samus, you find yourself heading down to a desolate planet called Talon IV after encountering an alien-infested space pirate ship in orbit. After you arrive, you'll begin exploring the world using a first-person view, but it really is a stretch to call it a first person shooter. Prime is pure platform hopping, pickup finding, puzzle-solving, backtracking frenzy. A large part of the game mechanics revolves around finding upgrades or other pickups in order to pass through a section you visited 20 minutes previously. While this is true to the Metroid legacy, it's a type of gameplay that will polarise players, with some loving the challenge but others seeing it as nothing more than linear déjà vu.

Gameplay is not helped by an unwieldy control system. Despite Nintendo being renowned for making slick, elegant control interfaces, Metroid suffers largely from a lack of a second analog stick. The left stick is used for turning and moving forward and back, with up and down movement of the reticle requiring the right shoulder button to be held down. The left shoulder button is used for auto-targeting, which mitigates some of the problems with clunky movement, but adds another major one. When the lock-on button is held down you cannot turn, and are limited to strafing only. This makes for gunfights that are stilted and clumsy, and at times a useful reminder that a battery-laden Wavebird Wireless GameCube controller can do serious damage when thrown at a screen.

Even after hours of play, the controls never feel easy or natural. Perhaps the best example of this is the visor used by Samus on her journey. The different vision modes are switched by using the left D-pad, and the method is akin to that used in Splinter Cell on the Xbox. The two major visor modes are combat and scanning, and scanning is a big part of the game. Most rooms have items or features that can be examined by locking-on to them while using the scan visor. The data retrieved is then downloaded to Samus' research database for perusal at a whim.

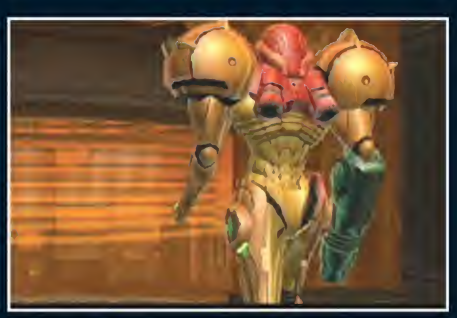
Just as Starfox Adventures recently raised the bar for what we thought the GameCube could do in the graphics department, Metroid Prime lifts it again to be simply the most stunning piece of eye candy to yet grace the little purple box. Right from the start, you will be overwhelmed by shiny surfaces, rich environments and little touches like the visual distortion as a Charge Beam pierces the air, all of which add to the carefully created atmosphere of the ruined Talon IV, where most of the game takes place.

Surprisingly, the game has very little glue to hold your attention. Unlike truly great games, you can easily bash away at Metroid Prime for an hour then walk away without the hollow longing an addictive game can bring.

For people who grew up on Metroid and have suffered the nine-year wait since Super Metroid, the new release will be pure joy. Retro Studios has faithfully recreated one of the iconic 2D platformers in 3D, and made it the best looking GameCube game to boot. The clunky control system can be made to work with persistence, and some people will dig the sometimes repetitive exploration and pickup searching characterising gameplay.

Despite the hype and build-up, Metroid doesn't provide an irresistible reason to buy a GameCube. It's a solid, good-looking 3D platformer, let down by poor controls and often infuriating gameplay. Metroid fans will love it, and it's still one of the better games available for the 'Cube, but there are numerous games of higher calibre available for all the other platforms.

8/10



GAME DETAILS

FOR: Gorgeous graphics; jam-packed full of nice nostalgia for Metroid fans; over 20 hours of gameplay; all-round solid play.

AGAINST: Clunky control system that you just can't get used to; repetitive gameplay: scan, scan and scan again.

DEVELOPER: Retro Studios www.retrostudios.com
PUBLISHER: Nintendo www.nintendo.com.au
DISTRIBUTOR: Nintendo www.nintendo.com.au
PHONE: Nintendo (03) 9730 9822

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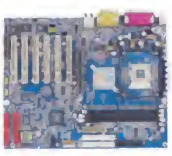

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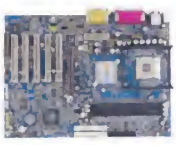

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- VIA P4X400 Chipset
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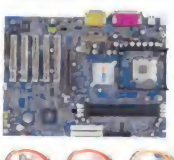

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Impossible Creatures

Wannabe geneticist John Gillooly goes all Mendel over this game.

ABOVE: You can't make five-arsed monkeys, but you can cross an elephant with a poison frog

ABOVE: Almost a typical RTS base attack; note the map on the control panel – mutants everywhere!

ABOVE: It doesn't matter what genetic material you've used – it's still a tank rush in anyone's book

In these heady days of stem cell research and genome mapping it's refreshing to slide back to a simpler time, when there were no geneticists, just mad scientists creating horrible mutant creatures the traditional way: with a lot of electricity and maniacal laughter.

Impossible Creatures is a tool of scientific bastardry: rather than creating an everyday Real Time Strategy title, developer Relic has gone back to the drawing board and redesigned some fundamental aspects of the genre (while borrowing the customisable unit concept from Dark Reign). The centrepiece is a system of building new combat units out of the bits of different animals, creating horrible monstrosities along the path to victory.

Underneath is fairly standard RTS fare. You are based out of a mobile laboratory, a flying train designed to move between the islands of a mysterious pacific archipelago as you avenge your father's death during the main campaign or just cause some chaos in the skirmish mode. You hire henchmen to build new structures and mine coal, which is one of the two major resources, the other is electricity, generated by lightening rods or generators that tap into steam vents.

But the major gameplay focus is on the critters. In the campaign game you need to use the main character, Max, to hunt animals for DNA samples during the course of each mission. Once you have a sample you can start building your new units. Each unit is built from two different creatures, and you have control over around five or six of the body parts on most creatures. By combining different limbs and other bits you can tailor the critter to have the best possible mix of skills and special attributes. Certain animals become regular bases for your creatures, especially in the early stages of the campaign where the choice of animals is restrictive. You can only have nine animals in your army and there are infinite hours of unit tweaking and testing to be had to get the perfect mix.

Impossible Creatures' campaign is well polished, bearing Relic's traditional cartoon-style cutscenes and a storyline filled with quirky characters like uber-baddie Upton Julius or nasty whaler Whitey Hooten. You progress across the archipelago searching for clues to your father's death, in the process experiencing a gradual change of climates and hence wildlife. The story is good but not the kind that sucks you in and ruins your life. Multiplayer or single player skirmish are the best hopes of longevity for the game.

As the game is focused on unit creation and tweaking, multiplayer is set to become an ever-evolving beast. Certainly, your first stab at creating a unit will be a horrific disaster. Only over time will the strengths and weaknesses of your units become apparent, but thankfully the game ships with a huge range of pre-designed creatures.

Balance is the key. You'll soon learn the reason your melee units are getting killed so quickly is because your grossly overpowered ranged units are doing area damage thus negating their advantage, or that your giant flying sperm whale can decimate the enemy with a single tail swipe but it moves at such a glacial speed that it is useless. Getting the right mix of all these things is the key to Impossible Creatures, and sets it up as a potentially killer multiplayer title.

Relic gained fame with a little game called Homeworld, which featured one of the most gorgeous and innovative game engines so far. Impossible Creatures does not live up to this level of visual richness, but it features a smooth next generation 3D engine that does not disappoint. The creatures look fantastic, a testament to the time spent by Relic getting the disparate pieces of animal anatomy to join together in smooth ways. To get the most out of the game you probably want to be running with antialiasing on, as the edges do get annoying, but this is the only real gripe.

While it might not destroy your social life with its addictiveness, Impossible Creatures is definitely the most individual RTS that you will play this year, and with the dedication of a little time and some frustrating moments it could well be a game to feature heavily on the Net and at LANs around the country.

8.5/10

GAME DETAILS

FOR: Different gameplay; and satisfaction of deep-set mad scientistic tendencies.

AGAINST: Average campaign; and time heavy.

REQUIREMENTS: 500MHz CPU; 128MB RAM; 16MB video card; and 1.5GB HDD space
RECOMMENDED: 1GHz CPU; 128MB RAM; and 64MB video card
DEVELOPER: Relic Entertainment www.relic.com
PUBLISHER: Microsoft Game Studios www.microsoft.com/games
DISTRIBUTOR: Microsoft www.microsoft.com.au
PHONE: Microsoft (02) 9870 2200

Unreal Championship

Interactive death TV is now even more grisly, reckons Logan Booker.

ABOVE: The analog controls aren't at all tedious. The gameplay, at times, is though.

ABOVE: UC makes good use of the NV2A, and there's definitelty a shader or two at work.

ABOVE: Graphics are similar in quality to the PC version – with the exception of the dodgy resolution.

Game death is a fact of life. All players grow accustomed to the fact that, in practically every game they play, virtual death is a consequence of one's electronic actions. So, with this in mind, Epic Games decided to craft Unreal Tournament 2003, and make dying all that more spectacular to watch.

For those who've bought (or plan to buy) Unreal Championship – the Xbox port of this PC frag-fest – you've nothing to fear. Death remains in all its glory, thanks to the marvellous antics of the Karma engine and fruity graphics.

The Karma engine is what makes those missiles fly and bodies crumple realistically. Arms flail, and the heads on player models bounce in a manner both nasty and disturbing.

But physics don't make a game, even though realism has been a theme seriously abused by game developers in the past. What makes a game is playability and longevity.

Unreal Championship is somewhat equipped to meet these requirements. Armed with five game modes, 40+ different player characters, and a juicy variety of environs, Unreal Championship seemingly has longevity stuck to the wall like a tail on a donkey.

On the subject of playability though . . . well, let's just say we've found the donkey.

Firstly though – the graphics department. UC looks *almost* like UT2003. The level textures are nice and detailed, creating a pleasingly sharp distinction between different arenas.

Two maps instantly come to mind: BR-BI-FROST and BR-ANUBIS, both featuring some very smooth and engrossing natural textures.

Water effects also appear to have been upgraded since the port, and may just make use of the Xbox's pixel shader-equipped NV2A. The poor chip gets a thrashing though, resulting in frame rate issues that are hard to ignore. A patch (yes, a console patch) is being released to rectify this problem, but until then, you'll just have to put up with it.

Character models are first-rate – as long as you're up close. While this is of little concern in the middle of a fight, it's gratifying to see a robotic torso or a flesh-metal leg flying through the air. The game however suffers from 'high-res graphics on a low-res display' that makes characters in the distance difficult-to-see, and really throws off aim and dwindling eyesight.

As for game modes, even with Bombing Run and CTF, UC is first and foremost DM. Simply put: gamers looking for depth should go elsewhere. UC does implement basic race and player statistics, but how these work in-game isn't always clear, and in the frenzy of battle, fades into irrelevance.

Also carried over from the PC version is adrenaline. When enough is collected, you can execute a combo to grant yourself a special ability such as regeneration. Along with this is your standard range of FPS power-ups: health, increased damage, and extra ammo.

Surprisingly slick for a console FPS are the controls. The use of the two analog sticks comes naturally – we imagined that control-pad wrestling would be the order of the day, but manoeuvring your virtual death-dealer isn't a hard task. Primary and secondary fire modes are handled nicely with the shoulder triggers; the only qualm being that when you hold down an attack, such as that with an Assault Rifle grenade, things get a little uncomfortable. The deafult controls are reconfigurable though.

Many original weapons make a return, with familiars such as the Flak Cannon and the frag-crippling Redeemer. Some weapons also include combination fire modes – the Shock Rifle is the best example: the second fire mode produces a nice sphere of electricity, which can be prematurely detonated with the primary fire mode – as long as you hit the ball.

If you read Bennett's Xbox Live feature on *page 40* of this issue, you'll notice we had a chance to play online.

Unfortunately UC is the least enjoyable game to play on Xbox Live at the moment. In large matches, and in complex environments, it was not unusual for players to 'warp' around as the console stuggled with the graphics.

The end result is a decent game, marred by slow downs and, at times, irksome gameplay. The frame rates we were getting made UC a painful experience when it shouldn't be. However, if all you're after is gaming death – both receiving and giving – then Unreal Championship is a respectable provider.

7.5/10

GAME DETAILS

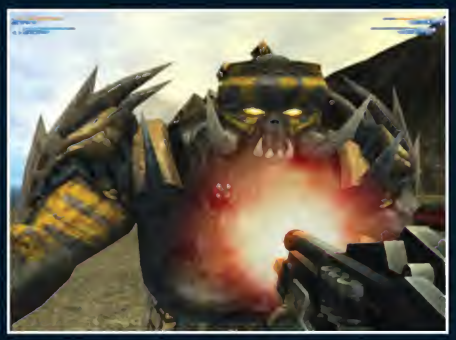
FOR: Good, solid graphics; nice texture detail; flying body parts thanks to the Karma physics engine; variety of game modes; and each character has different statistics.

AGAINST: Game modes are all DM-based; choppy frame rates; basic gameplay; and it's the only game that has lagged play on the US Xbox Live service.

DEVELOPER: Epic Games www.epicgames.com
PUBLISHER: Infogrames Australia www.infogrames.com.au
DISTRIBUTOR: Gamenation www.gamenation.com.au
PHONE: Infogrames Australia (02) 8303-6900

Unreal II – The Awakening

Bennett Ring had high hopes for the sequel to the awesome Unreal. . . silly boy.



ABOVE: This screenshot looks great – pity it runs at a meagre 10 fps when in action

ABOVE: Texture resolution is very impressive, as seen on the display screens in the background

ABOVE: Translucent effects, such as this warrior's body shield, are used extensively in Unreal II

The original Unreal was a revelation to first person shooter addicts around the world. Who doesn't remember the involuntary release of a couple of trouser nuggets during the infamous hallway scene, complete with lights slowly blinking out, or the awe of exiting the cramped tunnel network into a vast outdoor area, with a crashed starship and giant waterfall setting the scene? Compared with the corridor action the Quake series presented us at the time, Unreal was our first foray into worlds that didn't have walls running down either side of the screen. Can Unreal II live up to the high expectations set by Unreal?

Thanks to the use of the Unreal Warfare engine, Unreal II is a stunning game, but not as impressive as UT2003. Maybe it's because we've already seen the UW engine in action in UT2003 and America's Army that we weren't totally blown away this time. Massive open areas integrate seamlessly with highly detailed interiors, and there are more flashy special effects than you can shake a pixel shader at. However, most of the open levels are devoid of detail, looking very sparse, and half of these levels are very foggy. The use of fog is a surprise, as later levels prove this engine is very capable of displaying long viewing distances. Another problem is that the levels contain almost zero interactivity: apart from the odd gas tank to blow up, everything is made of magically indestructible material.

You'll need a PC brought back from the year 2007 to get Unreal II to run well – it managed to bring our 2.7GHz Pentium 4 and RADEON 9700 PRO combo to its knees, usually during crucial battle scenes. And that was at a resolution 1,024 x 768, with many of the details set to medium. Animation is for the most part quite nice, but it does occasionally suffer from the old 'running on the spot' syndrome, with enemies seeming to slide over the ground.

Gameplay is your standard first person shooter fare: clear the level of all enemies on your way to the exit and try not to get turned into soggy gibbage on the way. . . and that's about it. In between each mission you'll return to your humble little space ship, where you can walk around and talk to one of three different crew members. There's the obligatory hot chick who supplies you with mission briefings and occasional glimpses of nipple. Then there's the obligatory cyborg tough-guy who supplies you with new and interesting weapons as the game progresses. Finally there is the 'alien who speaks broken English' – we're still not sure what he's meant to supply, other than damn annoyance.

There is almost zero problem-solving, and each level is very linear. A couple of awesome levels revolve around setting up a rigid defence with laser fences and sentry turrets, but these moments of utter coolness are the exception rather than the rule. Doh. We played on medium difficulty and completed the game in around 10 hours. A co-operative online mode could have been awesome, yet the developer, Legend, in its infinite wisdom, included absolutely no multiplayer aspect at all. We might have understood if it left the multiplayer to UT2003, and instead focused all of its efforts on Unreal II, but considering the game can be completed in a mere 10 hours it's a disappointment to say the least. Obviously the developer has never heard of the word longevity. Not good at all.

To round out this rather mediocre package, Unreal II has a distinctly unfinished feel, in a buggy kind of way. One show stopper of a bug forced us to reinstall the game to get it to run again – thankfully our saved games survived this process.

In other sections, sounds got stuck in loops; when you consider we were using the most popular sound card – a SoundBlaster Live! – this is almost unforgivable.

While there are a lot of things that irk us about Unreal II, it's not quite as bad as the sum of its parts. There are a couple of memorable sections, and overall it's quite enjoyable. It doesn't come close to the game we expected it to be, and if you're after a game that will keep you going for months, or weeks, don't concern yourself with this.

7/10

GAME DETAILS

FOR: Very pretty engine; a couple of innovative levels; and nice weapon design.

AGAINST: As linear as a ruler; demands a PC that hasn't been released yet to run smoothly; and the game is all over far too quickly.

REQUIREMENTS: 733MHz or better CPU; 256MB RAM; GeForce2 MX or better.

RECOMMENDED: 4GHz+ CPU; GeForce 6 BS; 1GB DDR-RAM.

DEVELOPER: Legend www.legendent.com

PUBLISHER: Infogrames www.infogrames.com

DISTRIBUTOR: GameNation www.gamenation.com.au

PHONE: GameNation 1800 060 605

SimCity 4

Lachlan Newman is the new cast member on 'Sim in the City'.

ABOVE: In-game vehicles are now individual entities, free to terrorise busy intersections.

ABOVE: Undeniable proof that the *Atomic* community is everywhere – including SimCity.

ABOVE: All cities have a bit of roughage – just make sure the amount in your's is disgestable.

For many years, Maxis has simulated almost every single facit of life. From the smallest ant, to shaping an entire planet, and just just about everything between, it has largely defined the entire 'Sim' genre. Considering this, it comes as no surprise that Maxis has released the fourth iteration of its flagship product (no, not The Sims), SimCity. Aside from the obvious graphical improvements, the underlying focus of the game has changed slightly from its predecessors.

In previous SimCity games, gameplay revolved purely around the buildings of your city, with the needs of your Sims only important as a source of tax simolians. However, the massive success of The Sims and the canned production of Simsville have lead to a more personalised version of SimCity where the inhabitants of your town are more central to the game than the number of high-density skyscrapers you have.

This personalised feel is displayed in the new MySims feature. Using either the Sims that ship with the game, or importing your own creation from The Sims, you can move up to five Sims into your town. They then provide information on the local level, either praising or condemning the city services within their immediate surrounds. Move a Sim into a low value home, and if your schools and colleges are effective, they'll eventually move up the social ladder, moving into a more expensive house and better job. Place them in a home with high surrounding pollution and poor health care, and they'll fall ill and eventually kick the SimBucket.

The economic model has had a fair reworking from SC3K. Your civic buildings now have a specific area of influence, which can be altered on a building per building basis. Sims complaining about a lack of education in their area? You can choose between investing in the future and building another school to cover the need, or pumping the funds into school busses and more teachers at the current branch.

At the other end of the scale, your cities are far more interactive at the regional level. Rather than just having one mega-city covering all demands for housing, commercial and industrial needs, you'll be more likely to set up one city as a 'bedroom community' with your Sims commuting to nearby cities for employment, and your industrial city selling power to those who need it, without spoiling your urban paradise with pollution.

As mentioned, the graphics in SC4 are greatly advanced from its predecessor: rather than looking like a mass of pixels shoved onto a map, the buildings now look as if they could exist in a local city, orientating to the nearest road, and having architecture so the building can support itself. The tilesets are also far superior than those in SC3K, where all the buildings in a suburb looked remarkably similar. This has been solved by creating a pool of different objects, say a swing set, clothesline, different roof colours, etc., and placing them randomly on the building lots. Coupled with MySims, this increases the amount of personality your city can have, as well as allowing the player to further relate to the people of the city and have neighbourhoods recognisable after decades of game time.

The graphics also allow for a more visual indication of how your neighbourhoods are progressing and overall how good your mayor skills are. If an area is devoid of police protection, then the buildings will look run down and generally not a nice place to live, while protected upper-class suburbs will have tree-lined streets and pruned hedges.

The same graphical indications ring true for the traffic system. Rather than having to query the road to see how heavy the traffic is, the cars now act as independent entities. Depending on how roads and transit facilities have been placed, you'll either see the traffic flowing well, or faced with gridlock ahoy – if you needed to call in a fire unit somewhere, you'd have to anxiously wait for them to arrive from the closest station.

SC4's increased depth on the local and regional level will greatly satisfy SimVeterans, but may prove to be a little difficult to new gamers to the series. It enhances on the winning formula, and does so in style.

9/10

GAME DETAILS

FOR: Much more in-depth city building experience; volcanoes; ten-storey robots.

AGAINST: May be difficult for inexperienced gamers to get into.

REQUIREMENTS: 700MHz CPU; 128MB RAM; 16MB video card; 1GB HDD
RECOMMENDED: 1.8GHz CPU; 256MB RAM; 32MB video card
DEVELOPER: Maxis www.maxis.com
PUBLISHER: Electronic Arts www.eagames.com
DISTRIBUTOR: Electronic Arts www.eagames.com
PHONE: Electronic Arts (02) 9264 8999

Shenmue II

Dan Gardiner gets sucked down a rabbit hole. . . and finds himself playing Afterburner.

ABOVE: 'My name is Ryo Hazuki. You killed my father. Prepare to die.'

ABOVE: As you can easily see, everybody was kung-fu fighting. Or break dancing.

ABOVE: The interactive environments and story development make Shenmue II an absorbing game.

Shenmue II's rather long and convoluted history can effectively be boiled down to four words: Microsoft bought the rights. Originally released on the ill-fated Dreamcast over a year ago, S2 is something of a cult classic in Japan. Although there was a sub-titled European version, it hasn't yet had an official release in either the US or Australia because Microsoft snatched the sucker up. It's now been reincarnated as a slightly tweaked Xbox title. The question on every fanboy's lips: Is this enough to save it from obscurity?

Shenmue II continues from where its predecessor left off. Set in the late 1980s, it follows the exploits of a young Japanese martial artist named Ryo Hazuki as he attempts to track down the man who murdered his father. S2 is quite a difficult game to categorise because there is nothing else like it on either console or PC. It quite effectively blends several genres, including adventure, RPG, fighting and puzzle.

It's a sense of free-exploration, however, that's at the heart of Shenmue II. Played from a third-person perspective, you're dumped in Hong Kong at the start of the game with only one or two leads. It's up to you to investigate your surrounds and interact with the locals to reach your goals. It's about interaction and exploration – just about any person you see can be quizzed, and this creates a real sense of being in a living, breathing, environment.

Of course, there's a healthy dollop of action thrown in for good measure, too. This takes numerous forms, from learning martial arts Virtua Fighter-style, to mini-games such as gambling (including rolling dice and playing roulette); and there's even a load of cool old SEGA arcade classics (like Afterburner) hidden away on coin-ops within the game, all of which can be played through to completion.

Quick time events (QTEs) are another important part of the game carried over from the first Shenmue. QTEs mainly occur during cutscenes, and they offer a fairly hardcore test of a gamer's reflexes. Icons representing individual buttons or combos are flashed up on the screen, and you have to whack the corresponding buttons are quickly as possible. QTEs are typically chained together in quick succession – they're quite tough to get the hang of, and are usually both challenging and damned frustrating. They also tend to change the outcome of a cutscene – failure will set you back in the game, while success gives you an advantage.

Unlike the European DC release, the Xbox version of S2 has been redubbed in English. Although the new voice acting is far from what we'd call inspired, it actually adds a certain charm to the game. It's kind of like watching a badly dubbed kung-fu flick – although it's comical and a little silly at times, you still find yourself being drawn in and enjoying it.

Unfortunately, Shenmue 2 is really starting to show its age in the graphics department. Given the fact it's a close port from the Dreamcast version, it's not hugely surprising the visuals are a little lacklustre compared to most other Xbox titles. While the graphics have been polished for the Xbox version, and the main characters' faces are generally well modelled, the periphery characters and the landscape in general look a little blocky, rough and low on the polys. They don't even approach the amount of detail seen in newer games like Splinter Cell, or even older ones like Halo for that matter.

Despite these ocular shortcomings, the environments are amazingly immersive, and it's easy to suspend your disbelief and just be drawn into the world and its happenings.

There's no doubt Shenmue 2 will only appeal to certain gamers. You'll spend significantly more time talking to people than beating the crap out of them. It really relies on story and a sense of discovery to get you hooked. Unfortunately, this doesn't really do a lot to draw the uninitiated in, and if you haven't played the original, Shenmue II may initially seem a little mundane.

What the game offers above all else, though, is the feeling of living in another time and place. With a little patience, you'll find Shenmue II is one of the most distinctive and absorbing games available.

8/10

GAME DETAILS

FOR: Absorbing kung-fu action; unique, inspired, and engaging gameplay that you won't find anywhere else.

AGAINST: Slow pacing won't be to everyone's taste; graphics are a little dated; takes a bit of time to really get into.

DEVELOPER: AM2 www.sega-am2.co.jp
PUBLISHER: Microsoft Game Studios www.microsoft.com/games
DISTRIBUTOR: Microsoft www.microsoft.com.au
PHONE: Microsoft (02) 9870 2200

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My friends call me Sweary

Swear violently. Make your friends cringe at the vileness of your vocabulary. Launch a fierce, scathing verbal assault at your poor, defenseless box. Feel better? Didn't think so. We all know that abusing your system won't get you anywhere. Maybe gaol if your neighbours call up to report a domestic, but usually, you'll just seek the help of Dan the Man. And if you're in dire enough straits, you could bag a Logitech MX500.

IOOTM: Mt Tattoo

After reading your article on Mt Rainier-compatible drives in *issue 19*, I saved some dosh and bought a new CD-RW drive. It isn't the Yamaha drive that you spoke of in the article; it's a Lite-On 48x12x48 drive with Mt Rainier support.

Now don't get me wrong, this new CD-RW drive is a wonder, but other than forcing the issue with a Stanley knife and a small amount of creative spirit, how do I get it to write those pretty pictures on the spare bits of my CDs?

Mark Newcombe

You don't.

The feature you're thinking of is Yamaha's annoyingly named 'DiscT@2', which can indeed burn patterns on the unused portions of a CD, but which isn't available in drives from any other manufacturer – as of yet.

Yamaha's DiscT@2 and Mount Rainier support are two different things.

For more info on the subject, wander over to the Yamaha Website and check out:
www.yamahamultimedia.com/yec/tech/discta2_01.asp

Lazy drive

I've just bought a Gigabyte GA-8IHXP motherboard (Intel 850E chipset) and it won't cold boot properly. On a cold boot, it says that the Pri Master (primary master hard drive) wasn't detected and then looks to boot off something else. However, if I then press reset, it will detect the Pri Master and boot properly. Any ideas how I can get it to cold boot properly?

Taggart Lidbury

It sounds as if you've got a hard drive that takes too long to spin up. The motherboard will only wait so long before it goes looking for other drives (and other things to boot); drives that haven't spun up yet won't be detected.

Many motherboards have a BIOS option that lets you change the boot delay, to allow for drives that take longer than usual to show up. I've flicked through the GA-8IHXP's manual, though, and I couldn't find such an option.

So unless you want to trade in your hard drive (which doesn't necessarily have anything wrong with it, but might have a lousy bearing or bad motor), you're going to have to put up with the double-start routine.

FireWire beats SATA?

About a year ago, I upgraded a laptop HD and placed the old drive in an external FireWire (IEEE 1394, whatever) case; I use it to move data to and from the office. Using W2K and a couple of $70 FireWire cards, this setup works beautifully and is truly hot-pluggable.

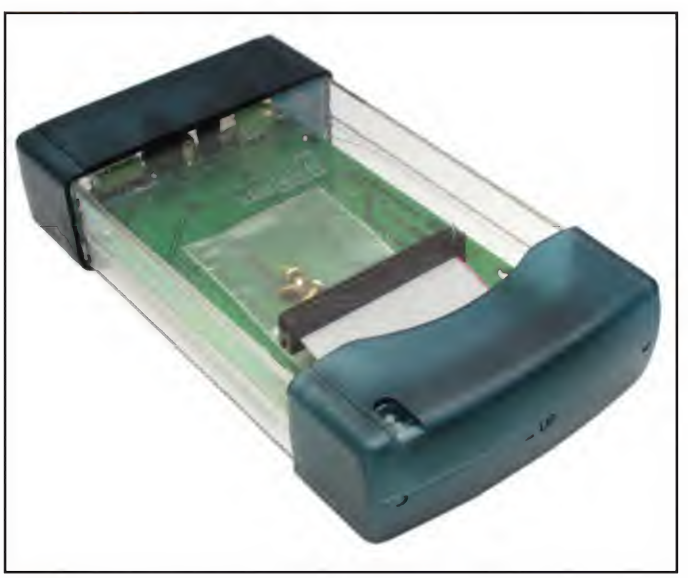
An added bonus is that as 2.5in drives only require 5V – the drive is powered by the FireWire cable.

I have recently seen little 'FireWire bridgeboards' that turn an ATA drive into a FireWire device, without needing the entire external case. I'm guessing that a CD writer connected in this fashion would have fewer 'issues' that result in slow, or failed, writes, as occasionally occurs with the standard IDE connection.

Over the past couple of issues of *Atomic*, some of your writers have been getting understandably excited about Serial ATA, but I'm wondering if a decent 7,200rpm ATA133 HD with a 2MB or 8MB buffer and a FireWire bridgeboard might prove to be faster, neater and all around better than SATA.

Are my assumptions totally incorrect and deserving only of scorn and ridicule?

Stuart Cairns



ABOVE: External FireWire drive boxes are neat gadgets (this one can plug in via USB, too), but FireWire-to-ATA hardware isn't ready for main storage use.

O FireWire conversion probably won't make a CD writer work any better. It's still running from an ATA interface, because that's all that it has; the ATA data's just being translated on the fly to FireWire. If anything, that'll give you more problems; the CD writer will get to be the only device on the ATA interface, but that's unlikely to have been a source of problems in the first place, unless you've been doing some seriously intense drive-flogging while you burn your CDs.

Even if you are flogging your drives, or doing something else that interrupts data flow to the CD writer enough that its buffer can't save it, modern CD writers can simply stop and resume writing (via 'Burnproof' or 'Seamless Link' or 'Just Link' or whatever your drive manufacturer calls it) without a problem.

Problems with CD writing, on current hardware, aren't actually very likely to have anything to do with the interface communicating with the drive.

FireWire-converted ATA drives also can't be faster than the same drives on plain ATA, for two reasons.

First, there's the translation layer between IEEE 1394 and ATA. When all of the data has to be translated from one interface to another quite different one on the fly, it's not going to move any faster as a result.

You might perhaps be able to see a small speed improvement with some really weird multi-drive simultaneous access stuff, but it'd depend on the bridge hardware, it'd only work for two or three drives at most, and it'd only be faster compared with those same few drives running two to a cable on ATA.

Then, there's bandwidth. The current theoretical peak bandwidth for FireWire is 400 megabits (not megabytes) per second; that's 50 million bytes per second, which is less than 48 real 1,048,576-byte megabytes per second (storage manufacturers continue to insist that a megabyte has one million bytes in it, because that makes their products look bigger and faster).

Fifty million bytes per second is quite unexciting compared with plain old Ultra DMA/66, let alone UDMA/100 or UDMA/133; UDMA/133 can theoretically move 133 million bytes per second (about 127 real megabytes). And then there's '150 megabyte per second' SATA, which is actually going to perform much the same as UDMA/133, if the data chain contains some Parallel ATA components with SATA bridge hardware on it. Which, as I write this, probably will.

Large ATA drives these days can manage sustained transfer rates around 50 and 30 megabytes per second for reads and writes, respectively.

This is becuase peak bandwidth is never the same as actual user data bandwidth (thanks to variety of things, one of which being interface overhead), but the large theoretical bandwidth advantage of the top-end ATA standards means that a regular two-connector UDMA/133 controller board or motherboard should be able to shift significantly more data than four 400Mb/s FireWire connectors (each connector on a FireWire controller has its own channel).

It should also be noted that if you want to boot a PC from FireWire, you're still pretty much certain to not be able to do it. All you need is a FireWire controller which your motherboard BIOS can recognise as a bootable device, but such controllers are virtually unknown, as I write this. Generally speaking, Macs can do it, but PCs can't.

I How long's a piece of string?

I have a P3 650MHz PC with 128MB of RAM, Intel 810 IGP and Win98SE and I am wondering if I should upgrade or not, and if so, what to. I would also like to know how long before I would need to upgrade again.

Andrew Williams

O Well, gee, I don't know.

Is your computer too slow for what you want to do with it? Then upgrade. Do you keep running out of disk space? Is your hard drive flogging all day because you don't have enough physical RAM for the programs you run? Do you want to play new 3D games that want a bit more CPU power and a lot more 3D graphics speed than you've got? Then upgrade. If you don't, don't.

This is too open-ended a question; I can't give you a more concrete answer.

I Ape for APIC

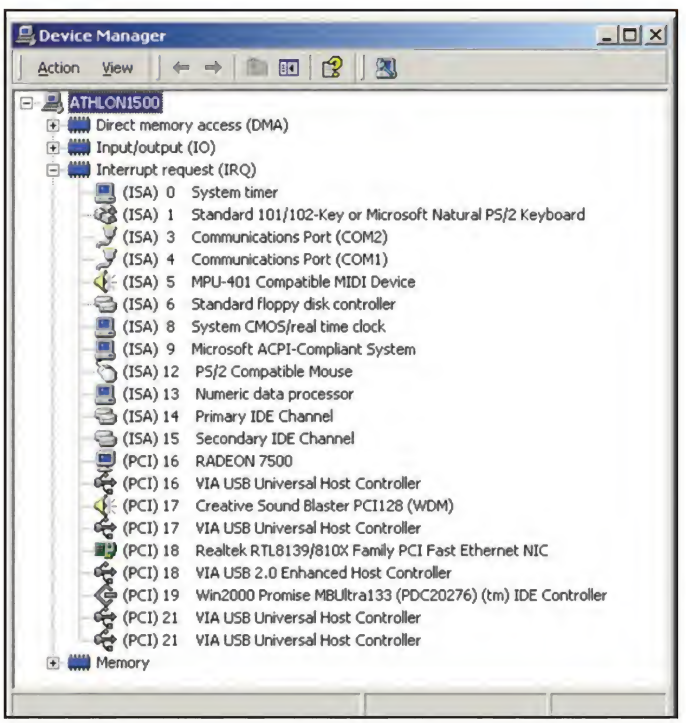
I recently set up a system with an ABIT AT7 MAX mobo. The 'APIC' feature in the BIOS caught my attention. After doing a little research I found this is a standard for enabling the two IRQs needed for dual processor setups.

Rojak's BIOS Optimisation Guide (www.rojakpot.com/bog.aspx) recommends enabling APIC on single processor systems, if you're using Win2K, XP or NT, for 'faster and better handling of IRQs'.

I use WinXP Pro, and with this feature enabled, I have IRQs available beyond the six standard PCI IRQs – I have IRQs 0-21 assigned.

A system builder informed me that devices must be APIC compliant, or problems will develop. I know ACPI requires device compliance, is this true for APIC also? If not, I can't see a downside to having more IRQs available.

Kevin



ABOVE: APIC drags PCs kicking and screaming into. . . well, into the 1990s, really. It's like your own time machine – but what a time to choose.

Yes, your Advanced Programmable Interrupt Controller (APIC) is a neat-o thing. As you say, it gives you a bunch more IRQs to play with, under NT-series Windows flavours, and also under other operating systems that can use it (not Win95, 98 or ME).

The big deal about APIC isn't so much that you get more IRQs, though, but that these IRQs are being handled by better hardware, not the ancient cascaded Programmable Interrupt Controllers that IBM compatibles have been using for a long, long time.

There's unlikely to be a down side to turning on APIC on systems that allow it. In Windows 2000, it'll allow the system to spread out IRQs and not pile them all up on the Advanced Configuration and Power Interface (ACPI) IRQ, but it won't make anything any better than it was, if you didn't have ACPI turned on already.

Not too long ago, turning off ACPI before installing Windows 2000 would help solve problems with video cards and sound cards inconveniently sharing IRQs, which would result in slow or wacky graphics and dodgy sound. These things can still happen, but practically all recent hardware is quite happy to sit on an IRQ with a whole bunch of other things, and not get narky at all.

WinXP spreads devices out as much as it can anyway, with or without APIC. Old hardware that doesn't share IRQs may well work better with APIC turned on, but I wouldn't bet on it; APIC does allow the system to share fewer IRQs, though. As I've said, with somewhat recent, standards-compliant hardware, it should work fine.

If your computer works perfectly well with APIC turned off, though, and you've only got one CPU, there's no reason to turn it on. You'll just give the system a big hardware-redetection conniption as everything, apparently, moves to a new place.

There's some technical info on APIC and why it's desirable here:

www.microsoft.com/hwdev/platform/proc/IO-APIC.asp

If that's not geeky enough for you, there's some info on Win2000 and WinXP's different IRQ-stacking behaviour, and what each strategy is likely to cause problems with, here:
http://slashdot.org/comments.pl?cid=3116583&sid=29023

Tweaking it down

When I built my new system (P4 2.4B GHz; MSI MAX2-BLR i845E mobo; Sapphire RADEON 9700 PRO; Maxtor 80GB ATA133 7,200rpm HDD), I ran 3DMark, and got 12,663. Not bad, but I expected more. I updated drivers, 600 point decrease. I tweaked around and got it to about 12,150. I expected a lot more out of a system like this. I asked around, got a lot of different answers. I did a BIOS flash, but that did nothing. I then emailed the owner of the company from which I bought the parts, and he told me a few Control Panel tweaks (FSAA, VSync. etc. . .). Don't ask me how, but I ended up getting 10,753!

I was shocked, and had no idea what was going on. Sandra 2002 says my 'Video card does not have an interrupt assigned', which the guy who sold me the parts said may mean my AGP slot's IRQ is also assigned to other tasks, which would slow things down.

A friend told me to shift around my PCI cards, which I have yet to try. I also have a PCI modem and a Sound Blaster Live! Platinum 5.1.

Manny Galouzis

As you say, 12,663 3DMarks isn't a particularly awful result for this system, but a 600 point decrease is around 5%, and therefore unlikely to be just test variance.

The standard deviation of 3DMark2001 tests, which is worth mentioning at this point, is up around half of one per cent. This means that if you run the standard benchmark over and over on a computer that 'deserves' a score of exactly 10,000 3DMarks, you shouldn't be surprised to get results in the 9,900 to 10,100 range, but there should be pretty much nothing outside the 9,850 to 10,150 range.

If you're wondering why the numbers vary, it's because the tests aren't exactly the same every time. You can see this quite easily – run the default 3DMark benchmark, and pay careful attention to the barrel, or barrels, bouncing around in the very first 'Car Chase – Low Detail' test. Sometimes the truck hits a barrel after firing a missile at the first flying bad guy, sometimes it doesn't. Sometimes the rolling barrel isn't even there for the truck to hit. In the next shot, one, two or no barrels can be rolling and bouncing around as the truck handbrake-turns into the next corner.

But all this should only account for around a couple of percentage points of difference, test-to-test, at most.

So where'd the 5% performance drop come from when you changed drivers?

Well driver updates won't always give you better performance. New drivers often are a bit faster, but an update might also fix rendering bugs that caused the card to get stuff wrong in a way that made it faster. Failing to render some textures, for instance, or leaving cracks between polygons that are meant to be seamless, can make benchmarks run faster than they should. New drivers that fix such problems can give lower performance numbers.

Your original score wasn't too bad, anyway. A 2.4B GHz i845E P4 with a RADEON 9700 PRO, with everything at stock speeds, is unlikely to beat 14,000 3DMarks. You managed about nine-tenths of that. A general rule of thumb is that you're not going to notice anything that makes a system less than 10% faster or slower for a given task, so you're probably only barely going to be able to pick the difference between a 12,663-3DMark box and a 14,000-3DMark one.

So, what causes the difference between apparently identical systems?

Apart from test variance and video card drivers, there's motherboard drivers, BIOS settings, RAM speed, background tasks, and the numerous tweaks which, as you've discovered, will not necessarily do you any good at all.

As far as the AGP slot IRQ thing goes, if your graphics card's sharing an interrupt with some other card then you may see problems, but shuffling PCI cards should only make a difference if you've got ACPI turned off, and you've also got a PCI card in either or both of the first and second PCI slots. Non-ACPI IRQ sharing varies depending on the motherboard; with ACPI turned on, no PCI slot should have a hard IRQ assignment. Most boards with an AGP slot should allow you to choose whether or not to assign an IRQ to your VGA card. For a variety of reasons, it's best to turn this feature on. In any case though, if your problem was related to IRQ sharing, and especially if your SB Live! failed to play well with others – as many of them do – you'd probably be getting crashes, not just poor performance.

The 'Ape for APIC' letter in this column has some more information about this issue.

Make it fastery, Igor! Fastery!

Each month we receive tw33x from g33x all over Australia. Some good, some fantastic. But we want more. . . dammit! Send 'em now to phr33xtw33x@atomicmpc.com.au and bask in the warm and fuzzy glow of *Atomic* respect.

Faster networking

You can speed up network and possibly Internet browsing by going to HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Explorer\RemoteComputer\NameSpace in the registry and deleting the key '{D6277990-4C6A-11CF-8D87-00AA0060F5BF}'.

Luke Hesketh

It seems there is a neat little 'feature' in all 32-bit flavours of Windows, which causes Windows Explorer and Internet Explorer to scan remote or shared files and folders over networks. This feature is related to Scheduled Tasks and is nothing more than a pain in the butt, causing annoying delays when traversing network directories and shares.

By removing the offending registry entry, jumping around networks can be a much less frustrating experience.

Some important advice though. Before you delete anything from the registry, you should always export the Registry Key to a file first, so you can restore it later, should things turn ugly.

Open Regedit and go hunting for HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Explorer\RemoteComputer\NameSpace. If you have Windows XP, then right click on {D6277990-4C6A-11CF-8D87-00AA0060F5BF} where you will have the option to export that key to a file. If you are using Windows 2000, you will need to highlight the key then click 'Registry' on the tool bar, then 'Export Registry File'. Follow the prompts and save the file somewhere convenient.

Now delete that key from the registry. The good news is you won't need to reboot. The change is effective immediately. Should you start having some problems, double click on the backup file you created to restore the registry entry.

This tweak should work across all versions of Windows although it was only tested on Windows 2000 Professional and Windows XP Professional. If, after you apply this tweak, you upgrade or reinstall Internet Explorer, you will find that the value has been recreated, so you will need to go through this process again.

This isn't the only way to tweak your network connections. Although this one is aimed at browsing local computers faster, there are many Websites on the Net that offer to 'boost your Internet connection', or tell you that 'your Internet connection may be slow! Speed it up now! Put a turbo on your modem!'. Ignoring the abuse of exclamation marks, there *are* ways of giving your broadband and narrowband connections a little pick-me-up. One good site is http://asia.cnet.com/itmanager/netadmin/0,39006400,39089320,00.htm. This site has a great registry guide for tweaking your TCP/IP settings. It includes MTU settings, as well as a bunch of reg keys you've probably never heard of. As always, make a backup of your current settings before poking around the 'hive'.

1337ness 8/10

Getting to the Administrator account

To allow the Windows XP Welcome/Logon screen to show the Administrator account you can edit the registry at HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Winlogon\SpecialAccounts\UserList.

Errazz

A default installation of Windows XP does not display the Administrator account on the Login page. To log in as Administrator from that page you would need to press Ctrl+Alt+Del then while still holding down Ctrl+Alt, press the Del key again. It is far easier to have the Administrator account already available on the Login page

All the usual warnings about screwing with your registry still apply, but fire up Regedit or Regedt32 and go to HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Winlogon\SpecialAccounts\UserList\. If it isn't already there, create a new Value called Administrator. Double click on it, give it a key value of one and select 'decimal' for the base. Close and reboot.

This tweak does nothing to improve your overall performance, but makes things just that little bit easier for Administrators.

1337ness 5/10

NetBEUI for XP

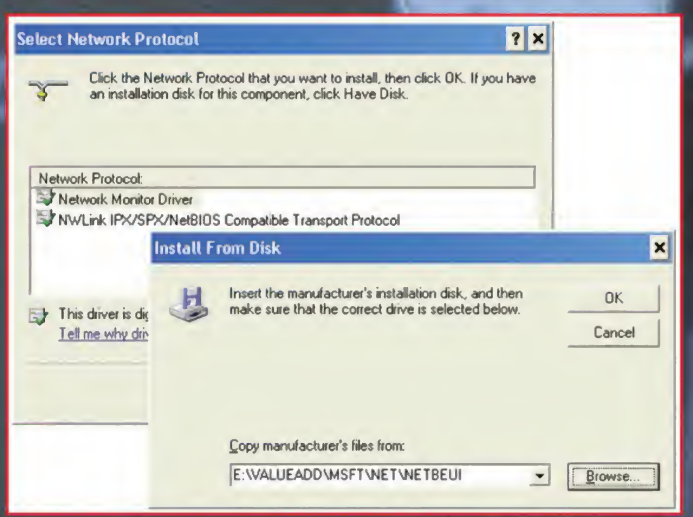
Windows XP doesn't allow you to add the NetBEUI protocol easily, although the files you need are on the XP CD-ROM. Use the following steps to install it:

In the properties for you Local Area Connection, click 'Install', double click 'Protocol' and then click 'Have disk'. Make sure your Windows XP CD-ROM is in your drive and browse to the \Valueadd\msft\net\netbeui folder. Open Netnbf.inf and follow the prompts.

Sm3agoL

NetBEUI was the default network protocol back in the days of Windows 95. Today, TCP/IP is the standard. NetBEUI is seeing less and less support due to its lack of routing capabilities. It is not an ideal protocol for large networks, but for small LANs it is just fine, particularly for accessing shared resources, and is actually the fastest protocol in most situations. Netnbf.inf and Nbf.sys are the only two files you need to install the NetBEUI protocol, and Microsoft have at least seen fit to provide those file on the Windows XP CD-ROM.

1337ness 6/10



ABOVE NetBEUI – it isn't dead just yet. Windows XP may hide it on its installation CD, but you can still install it as a network protocol.

SEE-THROUGH PSU

There's not much joy in paying for something kick-arse – like, say, a muntingly potent 400w PSU – and not being able to see the good bits inside. No sir! Ron Prouse takes us through a PSU mod that shows us the goods, which unfortunately, look fairly dull, so he shows us how to add a little light.

Several hardware companies recently began marketing translucent, plastic PSU covers designed to totally replace the cover plate. The product concept is cool, but the examples I have looked at have 'fitting issues' – the covers are very generic, and don't seem to line up correctly. The other small detail is that there aren't many PSUs with OEM interior lighting!

So, if you want a PSU window, some lighting, and maybe an additional voltage mod, what are the options? Only one really, and that's do it yourself! The supplies that you'll need will be something along these lines:

- a PSU – the example used is a 250W AOpen 'cheapie',
- cutting tools – a Dremel, jigsaw or similar, as well as files, sandpaper, etc;
- Perspex (acrylic) off cuts, and five-minute epoxy glue,
- an 80mm 'tailed' LED fan (bought from PC Range, [08] 8322 9544, $15.00);
- a 100mm cold cathode tube (bought from Jaycar SL-286X, $11.95, Jaycar SL-2868 inverter $9.95);
- green and brown hook-up wire, soldering equipment and heat shrink; and
- a female Molex plug (bought from Jaycar PS-0740, $2.25).

THE WINDOW

Fitting a window into a PSU is basically the same as fitting a case window, but a lot fiddlier! The preparation is important – unplug the PSU and take it out of the computer. Remove the screws that secure the cover. Have a good look for anything that is going to get in the way of fitting the Perspex to the inside of the cover, including any of the metal tabs that keep the cover in place.

That done, determine the size and shape of the window, allowing at least 15mm 'overlap' around the outside border where the Perspex will be glued in.

Once the dimensions are transferred onto the outside of the cover, it is a simple cutting job to remove the excess metal and then smooth all of the edges with a file and sandpaper. Cut the Perspex to size, leaving the protective paper in place except for where the glue will be applied. Make sure to 'rough up' the painted finish on the inside of the cover and the Perspex where the glue will go, so that it can 'grab' the surface. Apply the epoxy resin to the cover, carefully place the window in position and put something heavy on top of the Perspex to hold it down firmly while the glue does its thing.

For this project I used 4mm thick red Perspex, but added a bit of a twist. Using a router (the power tool, not the network component), I rebated the thickness of the 15mm overlap area by 2mm, so that the Perspex actually protrudes out past the outside of the cover by 1.5mm (the picture should explain). This gives a 'neon edge' to the window, and the visual effect of more light flooding out.

LIGHTING AND 7 VOLT FAN MOD

There is a simple way to add interior lighting to a PSU – replace the standard fan (or fans) with an LED fan, the likes of which are now available almost everywhere. The project PSU had a three-pin fan connector on the circuit board, so installing the LED fan was a matter of cutting away the 'pressed' fan grill, screwing the fan into position and plugging it in.

I wanted enough light to make the PSU glow like a nuclear reactor meltdown, and not just a mild glow. The solution was to add in a 100mm cold cathode.

There was plenty of room for the inverter to be fitted on the inside top of the PSU cover, and the tube fitted across the bottom edge of the window perfectly. Powering the cathode was easy – solder the wires to the 12V rail on the inside of the PSU, which also kept everything self-contained.

While the soldering iron was still hot, I had another small modding idea – by using the PCB +12V and +5V power headers as positive and negative respectively, I made up a specialized 7V lead. To save confusion later, I used 'unusual' colour-coding for the lead (green for +Ve and brown for the –Ve), and ran the lead into a normal Molex plug, also labelled as '7V only'.

So, for less than $50 and a few hours work, the AOpen PSU has been converted into something a lot different than the grey box it once was. A worthwhile mod? That's your call!

The fiddlier-than-a-case-window PSU window

Chuck your standard fan and replace it with this 7V fan mod

MODWARE

PC's are no longer boring. At Anyware, we distribute a wide range of special PC cases, lights, coolers, fan grills and other case modding gear. We call this MODWARE™. As a wholesaler, however, we do not sell directly to the public. Please ask your local PC dealer for stock and price information. Alternatively, you may contact one of the resellers below.

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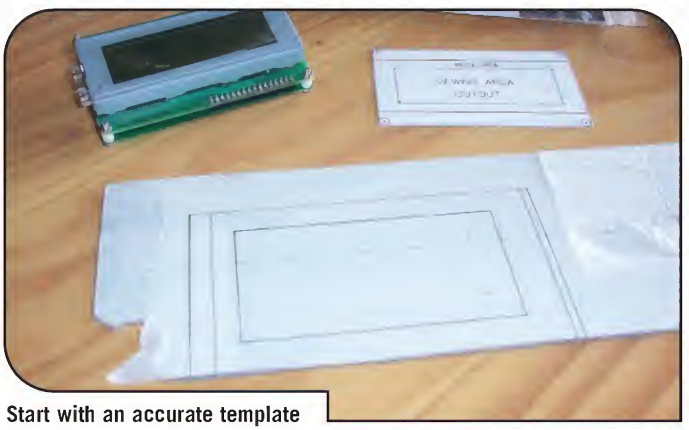
FITTING AN LCD DISPLAY

When you can buy a $20 item from Dick Smith why would you fork out nearly $200 for a top-of-the-line model? There are two basic options for many things in life: solid and reliable versus the quality thing which looks twice as good. Looks aren't everything but Ron Prouse's desire knows no price range.

You *so* need an LCD display


Start with an accurate template

THE MATRIX

Nothing looks quite as uber as an LCD display mounted in a modded computer case, displaying system-critical data. Or a Winamp vis. This is especially true when that display just happens to be the Matrix Orbital LK204-25PC. The moment I first set eyes on its white background, with high-resolution blue text – I just had to have one!

This is not a product review, but I think that it is important to explain some of the qualities to look out for when buying an LCD display, and why the Matrix Orbital www.matrixorbital.com display commands so much respect among modders.

• Quality displays make use of serial (RS-232) port connectivity, at data transfer rates up to 19.2K baud for alphanumeric applications, and 5fps or higher refresh rates. To me, this is an important factor, as it determines both the look of the display and the speed that data can be refreshed. The only word for serial connection is. . . crisp! According to a reliable source, in the near future you will be able to substitute the term 'serial' for 'USB' in the above paragraph.

• Products like the LK204-PC also offer extra functionality, such as the 'general purpose outputs' (GPOs) that can be used to control lights, relays, pumps, fans, etc. This particular unit has eight x 750mA ,12-volt, software-controlled power outputs. Yes, software controlled and easily programmed! Perfect for controlling a remote FanBus. You can even overclock the GPOs!

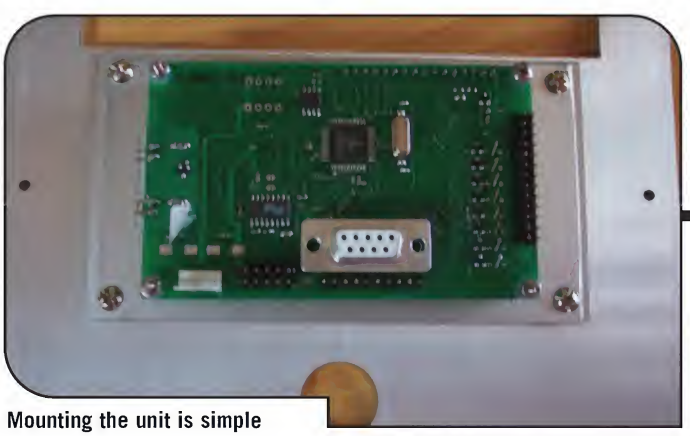
• Another advantage of buying a display that has been designed for a specific use is that you can either buy 'bare-bones', or option-in everything that you need (from cables to keyboards) for an 'out-of-the-box' installation.

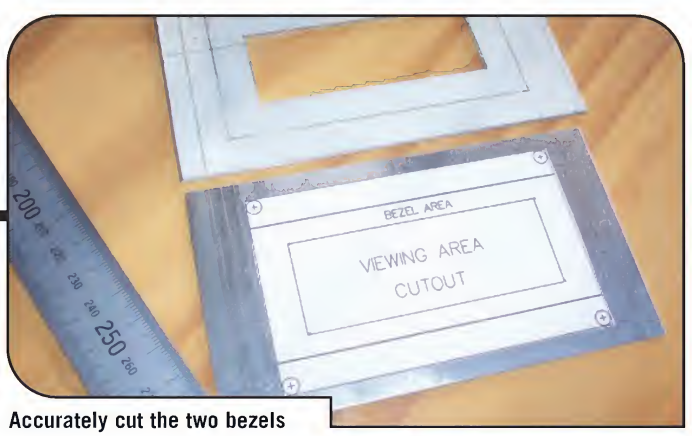
• LCD-centric software is plentiful, with many share and freeware programs written by case modders or coders with us in mind. Linux users will feel especially loved on this score! The LK204-25PC comes with a CD that has a good selection of programs, with lots of hyperlinks to useful sites as well.

IMHO, these are the type of things that separate the 'fantastically good' from the 'unimpressively average'. Sure, there is an appreciable difference in initial purchase price, but a Porsche will always cost more than a Hyundai, and your high-quality LCD screen can be moved from case to case for many years to come (apologies to the Australian Hyundai Owners Club).

FITTING THE SCREEN

The easiest method of fitting a Matrix Orbital LCD is to purchase one of the factory 5.25in face plates. However, due to the PCB


Mounting the unit is simple



Accurately cut the two bezels

size, you will also lose some of the 'access' to any bays above (or below) the installation site. In my PC, there are just too many peripherals vying for that scarce bit of 5.25in real estate, so I needed another solution.

The answer was simple: make use of those spare 3.5in floppy bays that I can never work out what to do with!

Now, this tutorial started life as a 'specific' mod for the Cooler Master ATC-210, but the same principals can be adapted to any flat surface of your PC – in a window, the case top, or even a desktop breakout box.

Now, the first thing to do is to make sure that there is going to be enough room behind the bezel for the LCD PCB and connections to fit. The Cooler Master is perfect for this, as the bays are in the centre of the case, and there is approximately 20mm depth of free space behind the bezel area. Remember, there needs to be enough room to allow for the circuit-board and connections, not just the display area.

To get the 'screwless' (the story of my life, really) look, I had to make two separate mounting plates – a rear mounting plate and a front fascia, cut out of a left-over piece of Lian Li side cover. As always, I have covered the sheet metal with masking tape to stop it getting scratched while working on it. This also has the added advantage of making it easier to draw the cutting guide lines on the surface.

MOUNTING, SCREWING AND STICKING

The next step is to determine the positions for the screw holes on the front fascia plate. After drilling 2mm pilot holes, the dimensions were transferred onto the bezel. To attach the display I am using standard 3mm 'computer screws', so the retaining holes in the fascia were drilled out to 4mm to allow for some final adjustment of the screen in relation to the opening in the case.

Four 2.75mm mounting holes, 4mm deep, were drilled into the back of the bezel plate, and then tapped to accept the mounting screws. The 5mm thick, solid aluminium bezel is one trait of the Cooler Master that other case brands probably won't have, so for this step you may have to drill the screw holes right through the front of your case.

Once the screen viewing area was cut out of the fascia plate using a Dremel, the mounting plate was cut and drilled to accept the LCD module. The adhesive template that is supplied with the LK-204PC makes this part particularly easy. It is important to countersink the screws that secure the module, so that the two plates will sit flat against each other and not leave a gap between them. Once the module has been attached to the mounting plate, cut out a section of the supplied black cover-trim decal to the same size as the outside dimensions of the display, and stick it into place.

The final assembly is simply a matter of aligning everything into the centre of the opening and screwing it into place with the four bezel screws. Once the power and serial cables are connected, and the bezel is fitted back on, it is simply a matter of firing up the computer and assigning COM port settings. As I mentioned at the start, the LK-204PC display is crystal clear, and the information is provides is easy to read at a glance. it even offers software brightness and contrast control. Finally, there is a use for those legacy 3.5in bays that actually make the Cooler Master look, well, much cooler.

WIRING

There are two small wiring tasks required to hook up the LCD screen to power and data.

The power wiring is a no-brainer, in this instance using either a standard FDD connector, or the supplied Molex-to-FDD adaptor. Data is pumped in through a standard serial cable, attached to a COM port. Standard? Not likely!

This is where being *Atomic* comes into play :). Sure it would be simple to bash a hole in the back of the case with a tomahawk (actually, that might even look pretty cool!), but I decided to aim for the 'tailored' (read: anally retentive) look.

To do this you will need:

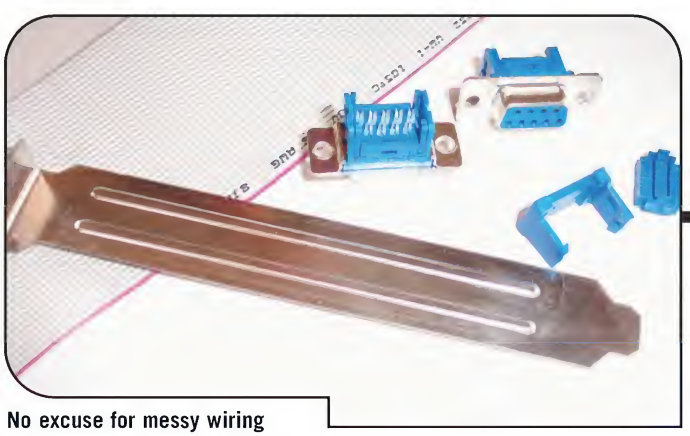
- An expansion slot cover (or maybe six, depending on your metalwork skills);
- Four RS-232 connectors (Dick Smith Cat. Male P2699/Female P2700 $3.90 each);
- A length of ribbon cable (or an old ATA cable) $3-$8,
- Two 3mm screws and nuts; and
- Something to cut the PCI cover with, and a drill.

The project is to make two D9 'male-to-female' leads, one internal lead from the LCD connector back to the rear of the case – fitted into the PCI cover – and another external cable to join the PCI connector to the COM port that is used to drive the display.

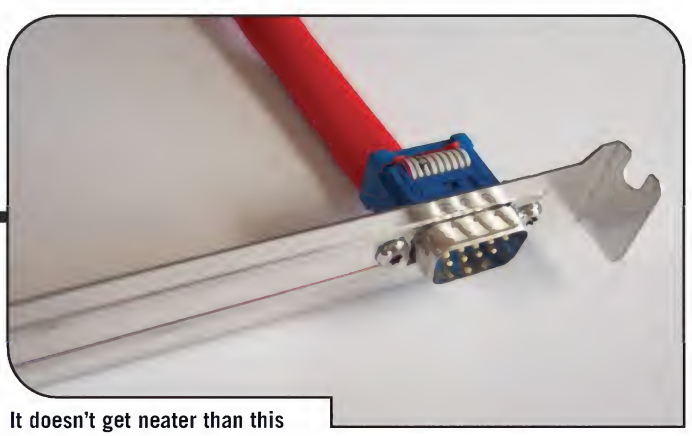
First step is to cut the hole in the expansion slot cover for the RS-232 connector to fit into. This is actually the hardest and most time consuming part of the wiring, but it is also the part that will make it either look really good, or really shit. So take your time with it!

The easiest method is to drill a 10mm hole at each end of the slot, and then remove the metal in-between using a Nibbler, a Dremel or a file.

Then drill the two 3mm holes that secure the connector to the cover. Not hard, just fiddly.

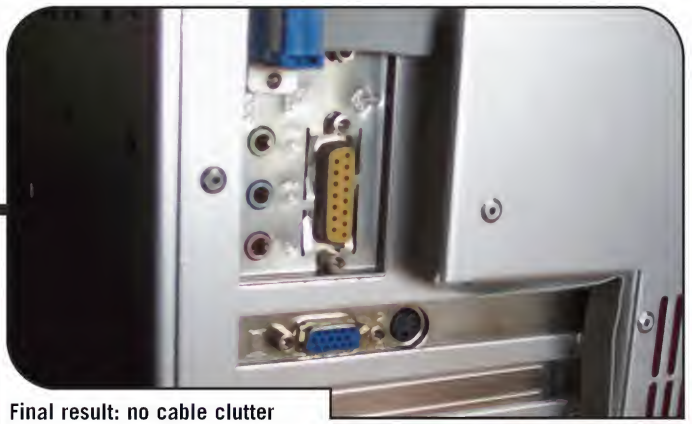


No excuse for messy wiring



It doesn't get neater than this

PVC cable sleeves are the bomb



Final result: no cable clutter

It took me two shots to get it right. . . on the first attempt the drill bit 'grabbed', spun the cover around like a lawnmower blade and wrapped it around the bit. (You might want to add Band-Aids to the above list.)

Seriously, whenever you are drilling into light-gauge sheet metal, it is really important to secure your work in a vice, or similar, and keep your fingers well out of harm's way. If you do have to hold things with your fingers, leather gardening gloves can be a good 'insurance policy' against losing skin!

OK, once you have stopped the bleeding, measure out enough cable to run from the LCD connector to the PCI cover, allowing an extra 20mm at each end. The same goes for the external lead. This part is empowering therapy for any modders who have ever wished they could make their own perfect length ATA cables. . . 'I choose that the cable will be THIS long!'

At this point you also have options as far as routing the internal cable to conceal it, or even using PVC tubing to make it look 'rounded', which I decided to do.

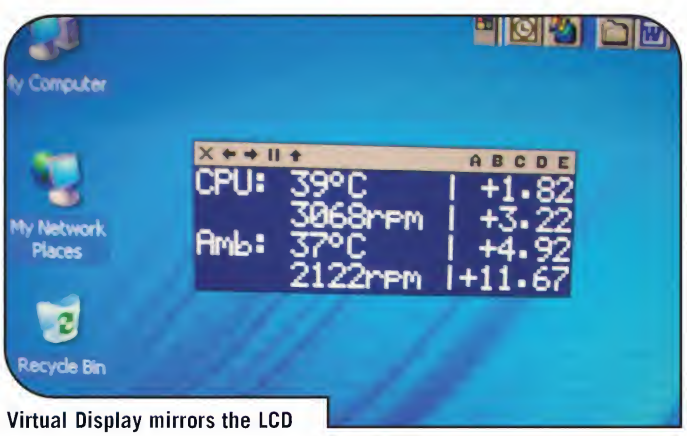
CONNECTING THE CABLES

The RS-232 connectors have a series of teeth that automatically bite into the ribbon cable to create the connection, and a push-fit locating cover that holds everything in place. A second cover then locks over the top to secure the cable from being pulled out.

The things to be aware of are:

• Making sure that each cable strand is locating properly in-between the teeth; and

• Ensuring that the wire 'Pin 1' is connected to the corresponding 'Pin 1' at the other connector. If you are using good quality ribbon cable, preserve the colour-keying concept by using the strand with the red line for #1.



Virtual Display mirrors the LCD

• Carefully trim the cable so that there isn't any chance of short-circuits or arcing.

As mentioned, I have used some PVC tubing to 'round' the inside cable – a useful tip here is to cut the end of the tubing so that there is a 'tongue' sticking out, which can then also be secured by the connector cover. The external cable has been left flat, so that it will sit neatly around the lip of the I/O panel recess, out of the way of other cables.

At this point it is a good idea to make sure that all of the connections are OK by using a multimeter to test the resistance 'pin to pin' over the entire assembly – if there is a problem reading you can then check the individual cables to locate the errant connection.

SOFTWARE

I mentioned earlier there are dozens of programs and plug-ins for LCD displays, many of them freeware or reasonably priced shareware. My choice of interface program is LCDC (US$17.50 to register – http://lcdc.planetdps.com), with system data from Motherboard Monitor 5 and Winamp being displayed.

LCDC is well supported, with plugins that cover a range of information services from weather and stock market reports, right through to SETI@home stats. There is also the useful fan control and event alarm software that can turn your 'pretty boy' LCD into a sophisticated digital BayBus. One of the other features which might appeal is the Virtual Display', which allows the same information to be shown on your PC screen in an identical format to the LCD. I used this feature for a month prior to fitting the LCD screen, and if you want a 'soft cock' option to actually fitting an LCD display then this might be the way to go!

Budding VB/C++ masters will happilly discover these units are dead easy to program for: it's simply a case of using the serial port to send a command code byte, followed by the command code for what you want it to do (all of the features you can access are comprehensively documented on the Matrix Orbital CD/Website). Sending text consists of just sending a text string over the serial port. It's easy to create useful utility programs – like how many MB/hr that online game is really chewing up.

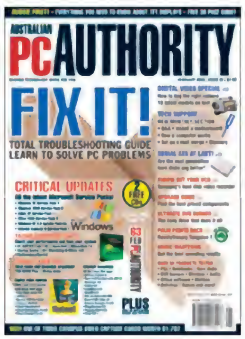
A final thought: do you have more than one computer? Would you like to keep an eye on all of them? Want to spread the cost of the LCD over several boxes? The idea of having your LCD display in a desk-top break-out box is nothing earth-shattering, but what about having a multiple input/single output D9 switch-box as well, so that you can have one LCD display showing any chosen data input channel?

Similar to a KVM switch, an electronic unit could even be set up to scan. . . Mmmmm, I'm off to the workshop. . .

(ajb.publishing)

The recent acquisition of *Penton Media Australia* by *AJB Publishing* creates an unrivalled portfolio of technology titles serving the Australian and New Zealand technology community.

WHO DO YOU NEED TO REACH?



PC Authority
SMB and consumer technology customers

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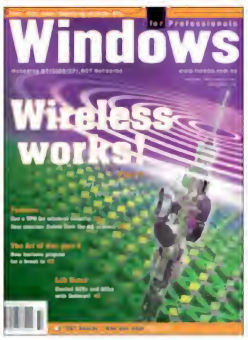
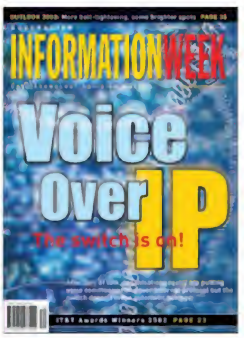
Noggin
Technology loving children



Windows for Professionals
Windows professionals, programmers, coders and IT managers



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Helping you reach every corner of the IT market

The Aural Decipher

THE GERMANS HAD ENIGMA (OR RÄTSEL MASCHINE). SCRAMBLE AND CONFUSE IT COULD. PLAY MP3S? NOT A CHANCE. YOU'D NEED SOMETHING LIKE MARK WHITE'S AURAL DECIPHER – A MASSIVE MOD OF INTEREST IN THE *ATOMIC* COMMUNITY. SO HERE IS A TUTORIAL, BY THE MAN HIMSELF, ON HOW TO MAKE YOUR OWN. IT PROBABLY WON'T ENCODE GERMAN INTELLIGENCE, BUT IT LOOKS COOL AND PLAYS MUSIC.

ABOVE: Aural Decipher in its finished and polished form. . . by the end of this three-part tutorial you could have one of your own.

Thousands of MP3s lurk on every Atomican hard drive. That's a fact, and takes into account drives located in machines where the aircraft-level noise produced by cooling equipment would block any reasonable attempt to hear music, let alone enjoy it.

If this sounds like you (or you just like the idea), what you need is your very own dedicated MP3 box, one you can customise and mould to suit any décor or need.

This three-part tutorial will guide you through the act of turning a standard PC into an embedded system where the humble keyboard, monitor and mouse will no longer exist – a custom array of buttons, an LCD (Liquid Crystal Display) or VFD (Vacuum Fluorescent Display) and a remote control will be in their place instead. It is based around 'Mark's Aural Decipher' Hot Box seen in *issue 23*.

This first part of the tutorial will outline the computer hardware that can be used to build the box, as well as guide you through the installation of the Linux Router Project (LRP) and Embedded Linux MP3 Player (ELMP). It will also briefly touch on the electronics needed to make the Aural Decipher completely standalone.

COMPUTER HARDWARE

No matter what you're building or modding – be it a Honda Civic with a full body kit or a bad-arse hot box – the quality and design of the hardware is what will make or break it.

There are three main areas that need careful addressing. First of these is the device to output the sound; the second is the need to make the MP3 box as quiet and energy efficient (low heat) as possible; and the third area involves doing anything that will make the box aesthetically impressive. Just a quick note: in order to follow this tutorial, you'll need to be sure the hardware you have (or are planning to buy) is compatible with Linux using the 2.2.19 kernel. This is very important if you do plan to buy, as you could end up making a costly mistake.

After scouring the Net for the best possible audio output device to be used, a number of sound cards and USB audio devices stood out as acceptable. Out of these, you would all probably guess that a member of the SoundBlaster range – be it an SB Live!, Audigy or Audigy 2 – rates highly for both sound output, drivers and features.

After considering these as possible devices I found the Xitel HiFi-Link Pro (local distributor: Metro PC metropc@bigpond.net.au). It is specifically designed for connecting a PC to hi-fi equipment, which is exactly what any serious MP3 box needs. I hope to experiment with the HiFi-Link Pro so I can give my personal opinion in the next tutorial. If you wish to find out about its features, visit Xitel's Website (www.xitel.com).

If you are going to use a PCI or ISA sound card, it is possible to buy a riser card (not tested), commonly found in industrial rack mount servers, so the sound card can be installed horizontally – otherwise your MP3 box will be too tall. Or you could just use an onboard sound card if height is a problem and you don't want to purchase a riser card.

Now. . . the best way to make any computer quiet is to remove every fan. 'Gasp!' I hear you gasp, 'That's absurd for any hardcore Atomican with their CPU or graphics card overclocked to the max, with seven fans cooling them!'

ABOVE: Small, quiet and efficient. . . the Acer 145W power supply used in the Aural Decipher.

ABOVE: Mark's original MP3 player stuffed tightly into an old CD player case. Sure, it's a rat's nest, but it still works well, especially considering it only costs around $50 to build.

Today however, we take the opposite approach. The VIA C3, while being sub-standard for any power hungry application, is perfect for use in the MP3 box because it's able to run without the need for any active cooling, and therefore removes the requirement of a CPU fan. All you would have to do is mate the C3 with a decent heatsink, such as the Zalman CNPS6000-CU, and you'll have one silent, cool CPU.

The power supply is the slightly more difficult aspect in regards to both size and noise. There are two main ways to attack the noise problem. One is to modify a power supply. *I do not recommend this*, as 240 volts of potentially fatal electricity linger inside. Plus, you'll void your warranty. The other way is to purchase one of the relatively new noise-reduced power supplies that are designed with a 'silent PC' mind.

In the Aural Decipher MP3 box, the power supply was purchased from Acer's spare parts division (product code 56.04145.GC1). The physical size is small and the audible sound produced is minimal – it is reasonably easy to find similar power supplies, but they do come at a price.

Lastly, the displays that are compatible with the ELMP software are the Hitachi HD44780 controlled LCDs – unless you feel like writing another display module for ELMP. The maximum character count that the software can drive is 4 x 40 and the minimum is 2 x 16. The Aural Decipher uses a 2 x 40-character vacuum fluorescent display, which is compatible with the HD44780 controller chip. These VFDs are expensive, at about four times the price of a similar LCD. If you have extra cash you don't mind using, I recommend the VFD because it has a wider viewing angle and looks impressive, but an LCD will suffice. I'll be talking more about the electronic side of this project in the next issue.

ELDERLY COMPUTERS

If you have an old computer you're using as a door stop and it's in the low Pentium class (or above), then you have a cheap alternative to buying new hardware. My first MP3 player ran successfully on an old Pentium 120MHz, with a SB 16 and an old 10BaseT network card, so your MP3 box doesn't need new hardware. If you are on a tight budget, it is feasible to build an MP3 box for under $100. So who's up for a trip to the tip?

THE LINUX ROUTER PROJECT

The Linux Router Project is a small and relatively unfriendly penguin. Seriously now, LRP is going to be the basis of our MP3 box. It is usually used as a gateway or router, but this doesn't detract from its versatility. The small installation size (around 2MB), and the fact the OS is loaded into RAM and then booted from RAM, makes it fairly perfect for the task – no need to worry about corruption here.

There are probably other distributions that can be used, or some of you have the knowledge to create your own, but in this tutorial I will only be dealing with LRP.

LRP INSTALLATION

Now it is time to round up all those skills and patience you've attained in building the Uber Linux box, and make a thrust back into the world of the penguin. This time unfortunately, the beloved TAB key is non-existent and those typing skills come back into play.

There are a few prerequisites you will need to meet before you can download and install LRP:

- You will need all your hardware installed and in working order. This includes a hard drive, floppy drive, sound card, CD-ROM drive (optional), network card (optional), motherboard with a parallel port and serial port, at least 8MB of RAM and at least a Pentium class CPU.

Note: The hard drive is assumed to be master and connected to the first IDE controller.

- You'll need the Linux Router Project itself and the LRP-modified kernel. You will also need to download RawWrite, as well as SYSLINUX, and the 'elmp.zip' file from the *Atomic* Website. Refer to the 'Downloads' box at the top of *page 84* for more details.
- A full distribution of Linux (Red Hat, Debian, Mandrake etc.) on a separate computer that has GCC installed, as well as the kernel development tools.
- Create or acquire a DOS boot disk that has 'fdisk', 'format' and 'edit' on it.
- A few blank floppy disks (who says they're dead?).

Once you have all your hardware and files ready, you can dive head-first into the installation of LRP. I recommend that you read all, or at least a large amount, of the documentation that comes with each program so you have a better understanding of their workings.

There will most likely be times when frustration will boil, and the best solution I have found if this happens is to walk away, grab a coffee, or simply do something other than fume over the problem. When you come back you usually see exactly what went wrong. Well, that's the idea anyway.

Now, boot up your MP3 box using the DOS boot disk and run 'fdisk'. Create two FAT16 partitions: one primary (where LRP is to be installed) and one logical (the location of the MP3 files). Make the primary partition size 7MB (anything above 3MB will suffice) and set it active. LRP boots from a FAT16 partition, which is unusual for Linux, but that's how it works. When you have finished creating the partitions and rebooted, format them both.

- Using another machine, extract 'syslinux.com' from the compressed SYSLINUX file that you downloaded and copy it to a floppy disk.
- If your DOS boot disk was created from a Windows machine, run the command 'lock c:' on the MP3 box to allow direct disk access (needed by SYSLINUX).
- Run 'syslinux.com c:' to install the SYSLINUX bootloader to the primary partition.

DOWNLOADS

Through this tutorial, I have referred to specific software/files that you will need to get this project happening. Here is a list of Websites where you can obtain them.

www.atomicmpc.com.au/misc.asp

'elmp.zip' – Contains the documentation/files for ELMP, and three LRP packages: smbmount, ftp and elmp.

www.linuxrouter.org

Linux Router Project – A small distribution of Linux used as the OS for the MP3 box. The easiest way of downloading all the necessary files for LRP is getting the so-called 'idiot-image_1440KB_FAT_2.9.8_Linux_2.2.gz' from one of its FTP servers (I'll assume that you have downloaded this file).

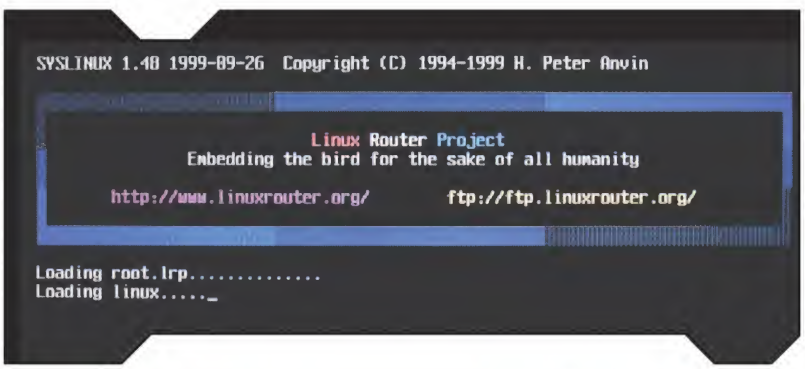
LRP-modified kernel source, version 2.2.19 – Required when you need to compile the kernel specifically for the MP3 box. Download the file '2.2.19-1-LRP.linux.tar.gz' from its FTP server.

uranus.it.swin.edu.au/~jn/linux/rawwrite

RawWrite – This is the program that allows you to write the LRP disk image to your floppy disk.

http://syslinux.zytor.com

SYSLINUX – The Linux boot loader for LRP. Download syslinux-1.48.zip and not syslinux-2.00.zip, because version 2.00 just doesn't seem to work properly.



ABOVE: The initial loading screen for the Linux Router Project – complete with the bold statement, 'Embedding the bird for the sake of all humanity'.

• Use RawWrite to create the LRP boot disk on the blank floppy using the file 'idiot-image_1440KB_FAT_2.9.8_Linux_2.2'.
• Copy all the files except 'ldlinux.sys' from the LRP boot disk to the primary partition on the MP3 box.
• Use 'edit' on the DOS boot disk to alter the 'syslinux.cfg' file on the primary partition. If you have more than 12MB of RAM, then change the number after 'ramdisk_size=' to '8096' (it is the size in KB of the initial RAM disk that LRP boots from). Also change ' boot=/dev/fd0u1440' to 'boot=/dev/hda1' (this changes where SYSLINUX will find the LRP files – from the floppy disk to the hard drive).

You should now have a bootable LRP installation on your MP3 box. If you restart your system, LRP should splatter the screen with a whole lot of text for around 14 seconds, and then come to a login screen. The login name for a fresh install of LRP is 'root' – there is no password.

LRP is a bit different than your usual distributions – any modifications to the OS you make need to be backed-up before you restart or shutdown, otherwise they won't be saved. Everything you see resides in RAM (unless you have mounted another drive). The people who created LRP have designed a simple menu system where you can backup any changes you have made to the OS – among other things. All you have to do is run 'lrcfg' and follow the prompts. Also, your text editor in LRP is 'edit'. If you wish to install other text editors, go right ahead.

One directory you may need to explore is '/var/lib/lrpkg'. It is where the files about the different LRP packages reside (more about packages later). Most importantly, it contains the files with information about what to back up for each LRP package.

THE LRP KERNEL

The LRP kernel is a slightly modified stock Linux linus-tree – you should have already downloaded the kernel source from the LRP Website. The kernel supplied with the 'idiot-image_1440KB_FAT_2.9.8_Linux_2.2.gz' doesn't include any sound support and doesn't include any specific drivers for hardware, which is why we need the 19MB of kernel goodness.

The following information is a brief outline of what needs to be done in order to compile a LRP kernel (and most others).
• You will need to know the specifics of your hardware – that is the chipsets that your sound card, network card, and other devices use.

If you are using newish hardware, you may need to source drivers from the Internet that you can add to the base kernel.
• Uncompress '2.2.19-1-LRP.linux.tar.gz' to a directory (usually '/usr/src') on the computer that has the kernel development tools.
• Run your desired kernel configuration program. There are some options that by default are not included; they must be included in the kernel for LRP and ELMP to work.
Note: the table opposite, on *page 85*, provides detail on these options.

The network options don't need to be included, but are assumed, as we will be discussing the FTP server and Telnet server in this tutorial. Also, don't go removing any options if you don't know what they do. Most of the default options that are included are needed – so be warned.
• When you have finished configuring the kernel, compile it into a 'bzImage' and copy it to a floppy disk using the name 'linux'.
• All that needs to be done to run the new kernel is to replace the 'linux' file, on the primary partition of the MP3 box's hard drive, with the new 'linux' file on your floppy disk.

With some luck, everything will go smoothly and LRP will boot up with the new kernel without any trouble. If it doesn't, then you will have to go back and recompile the kernel and make sure that everything needed is included. It may take you a couple of tries to get it right.

One last hint for compiling the kernel: in the 'Code Maturity Level Options', say 'yes' for 'Prompt for development and/or incomplete code/drivers' – your driver may be incomplete, but still usable (this is the case for the common Realtek 8129/8139 network card).

GENERAL SETUP
- **Parallel port support**
- **PC-style hardware**

BLOCK DEVICES
- **RAM disk support**
- **Initial RAM disk (initrd) support**
- **Initial RAM disk archive (untar) support**
- **Initial RAM disk minix auto fs support**

NETWORK DEVICE SUPPORT
- **Your network card drivers**

CHARACTER DEVICES
- **Enhanced realtime clock support**

FILE SYSTEMS
- **DOS FAT fs support**
- **MSDOS fs support**
- **VFAT (Windows_95) filesystem support**
- **Minix fs**

FILE SYSTEMS/NETWORK FILE SYSTEMS
- **SMB files system support (to mount a Windows network drive – optional)**

SOUND
- **Sound card support**

LRP NETWORK CONFIGURATION
If your network card driver is loaded by the kernel at boot-up, you can automatically configure the IP address and other network settings by using the file '/etc/network.conf'. By default, the network interfaces aren't configured. To configure them automatically, just uncomment-out the 'IFO_IFNAME=eth0' and type in the IP address, net mask and broadcast in the right locations. When this is done, make sure to backup the 'etc' package.

LRP PACKAGES
An LRP package is simply a tar.gz archive containing files to be loaded at boot (plus a few extra files inside the archive for backing up purposes).

There are several packages that come standard with LRP – most are required for even the most basic of operations. These packages include root.lrp, modules.lrp, local.lrp, etc.lrp and log.lrp, which are found on the primary partition of your MP3 box. So to add extra files to an LRP installation, you can append the extra file(s) to an existing package, creating a new package yourself or find someone else's package with the files you need, and then load it at boot-up.

ELMP PACKAGE 'N STUFF
I have supplied a file called 'elmp.lrp' with 'elmp.zip', which contains all the necessary files that are required to run ELMP on LRP. To add 'elmp.lrp' to the file structure of LRP at boot you'll need to do the following:

- Copy 'elmp.lrp' to the primary partition on your MP3 box
- Edit 'syslinux.cfg'. Add 'elmp' to the end of the list after 'LRP=' (eg. before 'LRP=etc,log,local,modules' and after 'LRP=etc,log,local,modules,elmp').
- Restart. If everything went according to plan, you should see 'elmp' installed during boot-up. The binary files 'elmp' and 'mpg123' should reside in the '/bin' directory, as well as a file called '.elmp' in '/' (to see '.elmp', you will need to use the command 'ls –a', instead of just 'ls').

While we're on the package subject, there are another two packages that you will need to install, which are also contained in the 'elmp.zip' file. They are called 'ftpd.lrp' and 'smbmount.lrp'. These two files contain everything needed for a simple FTP server and smbmount – so you can upload MP3 files (via FTP) and connect to Microsoft network drives. Follow the same steps as you did to add elmp.lrp to the boot process, just adding 'ftpd' and 'smbmount' to the configuration file instead.

By now you should be able to play MP3 files using 'mpg123', run 'elmp' (you can't do much else without the external circuitry), ping another computer, and use 'smbmount' to connect to a Microsoft network drive. You will still have to modify a few settings to allow Telnet access and FTP access, but that isn't too hard.

FTP AND TELNET
Ah, the wonders of remote administration, and the ability to upload MP3s without too much hassle! This is what some other commercial and homemade MP3 boxes lack. If these two methods of administration and uploading don't suit your tastes, then search for a better way. That's part of the greatness of Linux – it's so versatile.

To allow Telnet access over the Ethernet card, all you have to do is add a user (not part of the root group) to LRP, because you are not allowed to Telnet in as root (unless you modify '/etc/securetty'). FTP access is just as simple. Modify '/etc/inetd.conf' and uncomment-out the FTP line (this is so the FTP server will run at boot-up).

ELMP
There is quite a lot to ELMP, and the best way to understand how to use it is by reading the documentation that is provided in the 'elmp.zip' file. When you come across '[network]' and '[sb.drv]' in the '/.elmp' configuration file or the ELMP documentation, ignore them because they don't affect our installation whatsoever. They were for a dedicated ELMP Linux distribution, which didn't have any FTP support and was a real pain to use – hence why I am now using LRP.

A configuration setting that must be implemented before ELMP will work correctly is to let the OS create mount directories at boot. Edit the '/etc/network_direct.conf' file and add the line 'mkdir /mnt/mnt1 /mnt/mnt2 /mnt/mnt3 /mnt/mnt4 /mnt/mnt5'. If you want ELMP to run automatically (I'm assuming you would), add the line 'elmp &' to this same file after the above line.

You will find 'ELMP v2.1.pdf' in the 'elmp.zip; file; this PDF document contains the schematics for the external circuitry that makes ELMP standalone. I will be discussing more about this in the next issue, but if you want to proceed ahead, by all means. You're going to need to know how to flash a PIC16F84 chip and use MPLAB to compile the PIC source code though, as well as some basic electronic knowledge – nothing too hard for any keen Atomican.

WHAT'S UP NEXT MONTH
So you now have an MP3 box that does a bit, but nothing much more than an ordinary PC with an MP3 decoder (hoorah!).

Don't despair – this will change in the next issue of *Atomic*. I'll be covering a few topics, including the LCD wiring, how to compile and load the firmware into the PIC16F84 microcontroller, and PCB (Printed Circuit Board) manufacturing. So get ready for the next instalment – where you'll edge ever so closer to the MP3 box that will be the envy of friends. . .

Search for a super model Pt3

In this third and final 3D tutorial (for now), Ivon Smith shows you how to create a head for our alien character model and add facial expression animation controllers.

Alien head – how to get it right

To illustrate a few different techniques, we will make the head as a separate mesh object rather than as an extruded part of the existing body mesh. This is useful when creating characters or scenes that are composed of many parts (such as games characters), which you can Merge into a final assembly scene file. Thus, variations on heads, boots and weapons can be swapped using Replace from the File menu. Be careful to take note of the scale of the original scene objects to ease these procedures.

In Photoshop I isolated the two sketches of the head and created a new Targa (.tga) file to use as a texture (Diffuse) map in 3ds max for my guide Plane objects (note: 3ds max requires image map files be RGB mode, not CMYK).

Ensuring Show Map in Viewport (within the Material Editor) is activated, select the head image in the Diffuse mapping channel as we did for the entire body image last time. Create a suitably-sized Plane object in the Front viewport, add a UVW Map(ping) modifier to it, while keeping the default Planar mapping and apply the guide texture to aid in the creation of the head. Create an Instance copy of the Plane by holding the Shift key down, using Select and Rotate and spin the copy by around 90 degrees (see FIG 1).

In 3ds max, create a Sphere Primitive in the Top viewport, centring it at (0,0,0) using the Select and Move tool's Transport Type-In (F12) while working under the World co-ordinates system.

As is often helpful toggling the selected mesh object into transparent mode, as shown in FIG 1, using Alt-X enables you to keep working in a single viewport while following the guiding image behind the model.

Symmetrical 3D modelling

The head will be made by symmetrical modelling, as was the 3D body (3ds max5 only). It could be mirrored to make the opposite half, attached and vertex-welded to complete the whole object (see box out).

Firstly, we must add some modifiers to this low-poly Sphere Primitive. To reduce memory usage and interactive speed. Try to begin modelling in as low polygon count objects as this will allow you to produce the desired shapes. Except for games models, you can generally use MeshSmooth to add detail and smooth curves, and this can be switched on/off in viewports, but left active in final renders.

I have used a Sphere of radius=110, 18 segments. Add a UVW Mapping modifier above the Sphere level setting (Parameters I Mapping to Spherical in the Command Panel I Modify TAB, and then add an Edit Mesh mod). Select the Polygon sub-object selection method (keyboard 1,2,3,4,5 allow all sub-object level selection types) and then in the Front viewport drag a rectangular selection across the entire left hand side of the sphere (F2 highlights this nicely), ensuring Ignore Backfacing is not checked. When the left polygons are selected, hit the Delete key, confirming 'OK' to deleting isolated vertices when it pops up.

In Vertex sub-object mode select the bottom most vertex to pull it down to match the approximate lowest point of the face/head whil in Front view mode. Use of the Soft Selection method is needed here.

Open up the Soft Selection rollout under the sub-object selection region of the Modify TAB, check the Use Soft Selection box, drag the value spinners up for the Falloff until the vertices around the selected one (red) start to be changed in colour showing the influence over these vertices that the Move operation will have.

By default, the Soft Selection affect Falloff displays vertices as red, orange, yellow, blue going from maximum to minimum (zero) influence of a transformation (move, rotate, scale).

For my sphere, at 110 radius, I set the Falloff to 180. Now when you pull the base vertex down the surrounding vertices move a little too, creating a more natural face shape, rather than a single vertex moving on its own which would produce a spike in the mesh.

Using various sub-object selection methods, pull and push areas of the head to fit the image of your character's head. You may need to vary the Soft Selection Falloff value or even toggle it off sometimes when you want to produce more sharper creases in the mesh.

You will be primarily flicking between Front and Left/Right views to get the shape accurate to the your guide drawings, and having the Perspective view available is always useful to keep checking your shape. Also, unless you have a high resolution mesh at this stage only bother trying to fit the mesh to the drawings of the overall head structure. Any bits that stick out (or in), like nose, eyebrows, cheeks may be added later via polygon extrusion, bevelling and other techniques, and refining the mesh with the Cut command or Slice modifier, followed by the Edit Mesh

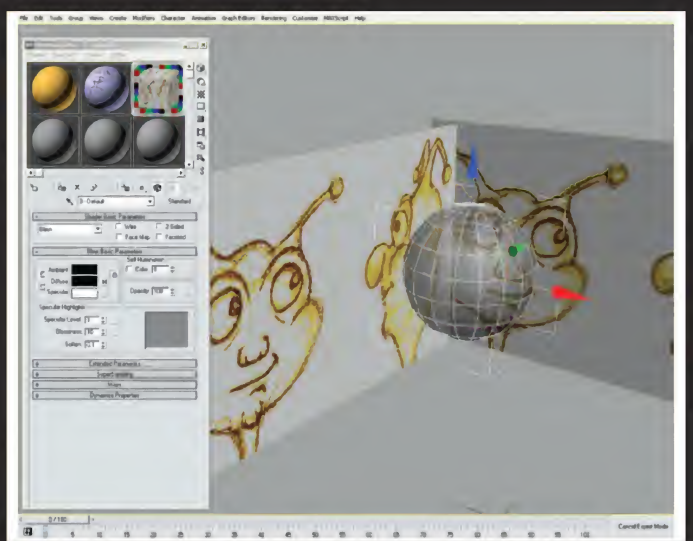


FIG.1: Once scanned in, your sketch can be used as a guide for your model.

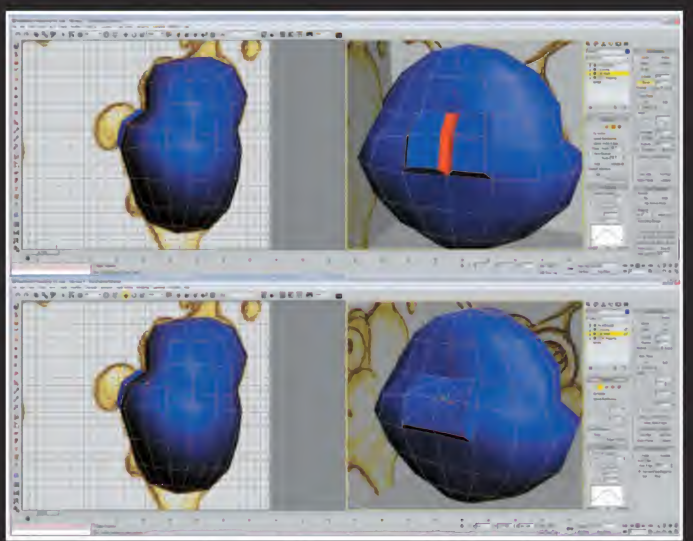


FIG.2 (A&B): Deleting extra polygons and Grid Align Edge sub-objects.

mood to then continue modelling

One thing to be cautious of, especially when using **Soft Selection**, is to ensure all the vertices along the centre line of the head remain lined up along the vertical world zero axis (when looking from the Front view). Often, when moving vertices sideways during modelling, some of those central ones get pulled off this axis via **Soft Selection** influences.

Not to worry, this is easily fixed. Select those offending vertices carefully (or even just all those that are meant to lie along this vertical axis) activate a side viewport, and in the **Command Panel I Modify TAB** hit the Grid Align button. This zeros all the selected vertices with the viewport grid axis/plane you are 'looking at' in that viewport. **View Align** is similar, but only lines all the vertices up with one another about an average axis position, not specifically the zero value.

Try out these techniques with random objects/scenes to get a proper feel for how they work.

In 3ds max5 we can now add the **Symmetry** modifier and continue modelling the whole head. This can be done at almost any stage. To actually see both halves in the viewports hit the **Show end results** on/off toggle button under the **Modifier Stack** window while you still model on the **Edit Mesh** level.

It may be easier, also, to deactivate the **MeshSmooth** mod using the bulb icon on its left side in the stack. However, as with the **Instance** method of duplicating the half-head, any **Bevel** operation on polygons along the centre line will not only cause one side of the polygon to go off the central axis, but will also create a whole new supporting polygon on the open side of the head. Delete any such extra polygon faces after they are created, and **Grid Align** any sub-object edges that go off-centre.

FIG 2: Select the appropriate one or two polygons in the front centre of the face to extrude for the nose. Perform the above extra polygon deletion action, and before you continue extruding use **Make Planar** on the selected nose polygons to flatten them to improve extrusion response. Continue extruding, bevelling, rotating sub-objects, deleting extra polygons, realigning with the central axis, as well as moving vertices with and without **Soft Selection** to get as close as you can to your guide drawing. Test it out often, by reactivating **MeshSmooth**. Notice that to improve display clarity. In the example a blue material has been applied to the head, the Opacity value has been set to 70, Specular Level=51, and Glossiness=19, as **Alt-X** transparency can sometimes make it hard to pick out details.

Eye sockets – take a good look

FIG 3. Next we have to make the eye sockets. From Front view in the example, six polygons are visible on the front of the head that

Symmetrical modelling – a cheeky half and mirror

New in 3ds max version 5, symmetrical modelling can be done by creating the object as described in this article up to the point of deleting half the mesh. Then in the Front view, with sub-object deselected, using the World co-ordinate system, and with **Use Pivot Point Centre** selected, click the **Mirror Selected Objects** button on the **Top Tool Bar**. An option box appears, in which choosing x-axis and zero offset should display in the viewport that the half-object has jumped across to the other side. Choosing **Copy** will duplicate this half-object, however for this exercise choose **Instance**.

A **Copy** is an exact, but independent clone of an object. An **Instance** clone is an exact duplicate where the original and the clone are dependant on actions and modifications performed on each other. For instance adding or altering **Modifiers** on an object will do the same to an **Instance** copy of itself, and vice versa. So as we model by extruding polygons and moving vertices on one side, the other side will now mirror this. This helps us see how the whole head will look instead of working with only half.

At the end of all symmetrical modelling, we will attach the copy half to the original with the **Attach** button in the **Modify TAB** panel and weld together all the coincident vertices along the vertical centre line so the two parts become one continuous mesh. Two important factors must be mentioned here. **Attach** works at the **Edit Mesh** modifier level of an object and any **MeshSmooth** mod above the last **Edit Mesh** mod should be removed from the stack before attaching.

The **MeshSmooth** would then be added later after welding the central vertices. Also, while **Instance** copies are useful in mimicking the original object's alterations, they cannot actually be attached to the original mesh, so after symmetrical modelling is finished and once all the modifiers above **Edit Mesh** are removed, the **Instance** copy should be converted to an independent **Editable Mesh**.

So, right click the **Instance**, go to **Convert to:** on the **Quad Menu** that pops up, and select **Editable Mesh**. Only then can this half mesh be attached as described earlier.

Thus when you hit the **Selected** button in the **Weld** section of the **Modify** panel, each pair should fuse into a single vertex. If a message comes up saying 'No vertices within weld threshold' simply increase the value next to the Selected button to weld to vertices within this new range. The **Weld Target** button allows you to drag a vertex over another, and when the cursor changes to a cross releasing it welds the two into one. Once the two halves have become one mesh, you will need to re-add any other modifiers that were taken off prior to attachment.

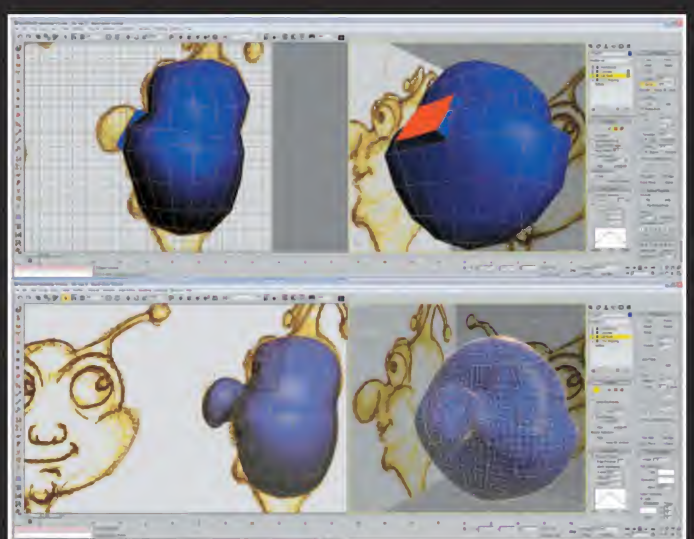


FIG.2 (C&D): Make Planar the nose polygons; and modelling with MeshSmooth.

FIG.3 (A&B): Making the eye socket polygons and performing polygon cuts.

approximate the postion of the eye socket. Vertices are moved (often using Local co-ordinates) to stretch these polygons to fit better.

We now use the Cut command on these selected polygons, but must set-up the snap tool options first. In the Top Tool Bar right click the 3D Snap Toggle button to open the options window. Under the Snaps TAB uncheck all except the Edge box. Close the window, and working as close as you can to see all the selected polygons, hit the S key to activate snap.

This displays a pale blue cursor unit whenever you hover over a polygon edge.Activate the Cut tool in the Command Panel and click to start a cut once you are over (and snapping to) one of the eye socket polygon edges. Click and drag the dotted line that appears to the next edge inside the socket polygons and click to cut. A new edge should appear, creating a new polygon as well. Repeat this to produce a rim of smaller polygons (see FIG 3).

Double right click to exit Cut mode, S key to exit Snap mode. Keep the formation of these polygons neat, and snapping to edges only so you don't produce any strays, as these will corrupt the MeshSmooth surface with glitches or discontinuities. Again, check up at the MeshSmooth level that a round enough eye socket is produced. If necessary, move the corner vertices to produce more of a round shape than angular or square.

As a smoothed mesh loses much of its corner definition, before you began to Bevel/Extrude the eye sockets in, select and downsized the polygons where the sockets would be (not the rim anymore). Use the Local co-ordinates, and restrict the scaling operation to the two axes tangential to the polygon surface, namely x and y.

Use Show end result on/off toggle to get a better idea of how big the socket hole entrance will actually be as you Extrude/Bevel inwards. I used two Extrude/Bevel operations, the first actually increasing the Bevel of the hole size so the entrance was smaller than the inside space. I formed the eyebrow ridge by performing an Extrude/Bevel operation and some vertex moving.

Facial features

Making the protruding cheeks was a simple matter of locally pulling out the vertices in the low-poly version with MeshSmooth active. And the antennae were simply extruded from a top-of-head polygon, resizing and moving vertices and polygons along the way. The mouth cavity was produced in much the same way as the eye socket, except a horizontal edge at the front where the mouth should have been was chamfered via the Quad Menu operation to create a new central polygon.

Then polygon cutting was done to form the lips, and the mouth cavity was extruded inwards. Using Soft Selection, the vertices at the corner of the mouth were moved to form the smile and to better fit the rounded profile of the face.

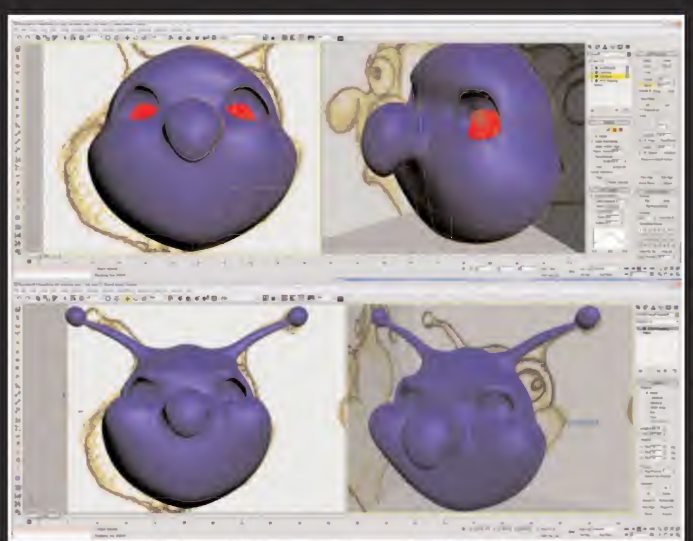


FIG.3 (C&D): Eye sockets resized and extruded inwards, along with cheeks.

Eyeballs that look around

FIG 4. To make eyeballs that can look around, we will use a simple Primitive Sphere. We will complete one, then Mirror its structure and position, and leave it as a separate object from the head mesh, as the head was kept separate from the body mesh.

We will create a Sphere in the Front view in order to simply colour some of the polygons at the local 'top' of the Sphere to form the round pupil of the eye.

In the Front view, select create Sphere, check the Auto Grid box, and you may want to try checking Base to Pivot in the Parameters section. Auto Grid begins creating an object directly on any surface the cursor hovers over. You will see an axis gizmo moving around on the cursor as it moves over the face mesh for instance. This may take a few tries, but start creating the Sphere with the cursor on the inside of the eye socket. The exact size and position can be tweaked later as needed.

Hit F4 to toggle on Edged Faces mode so you can see the round set of polygons at the front of the Sphere where the pupil (and/or iris) will go. Position the eyeball as best you can and you may also need to move some of the vertices in the low-poly face mesh to make the edge of the socket hug the eyeball properly.

Add a Spherical Mapping UVW Map(ping) modifier to the Sphere. Open the Material Editor and with a blank slot selected hit the Standard button to load a new material type. Load a new Multi/Sub-Object material from the browser. This allows you to apply different material textures that lie in the channels of the MSO material onto different polygon selections on a mesh by way of identity (ID) numbers applied to selected polygons of that mesh. Name the material, perhaps MSO Eyeball.

In channel 1 of the MSO material click the material slot where it should say Material #0 (Standard) and create the material that opens up to be a bright white with high Specular and Glossiness values and Self Illumination=35. This can be named White. Hit the Go to Parent arrow button to go back up to the MSO material level. Repeat this process in channels 2 and 3, creating iris colour in channel 2, and black pupil in channel 3. When done, hit the Assign Material to Selection button to the sphere eyeball, or drag-and-drop the MSO material from the slot position in the Material Editor.

Add an Edit Mesh mod and in Element sub-object mode click on the Sphere – with F2 active it should turn red. In the Surface Properties rollout type in a '1' in the Material I ID entry box. This gives the entire sphere mesh a material ID=1 to start with. Choose the Circular Selection Region fly-out on the Top Tool Bar and in Polygon sub-object mode drag a selection around the two rows of front polygons where the pupil/iris will be, ensuring Ignore Backfacing is checked. Only these polygons should go red now. Give these selected polygons a Materials I ID value of 2.

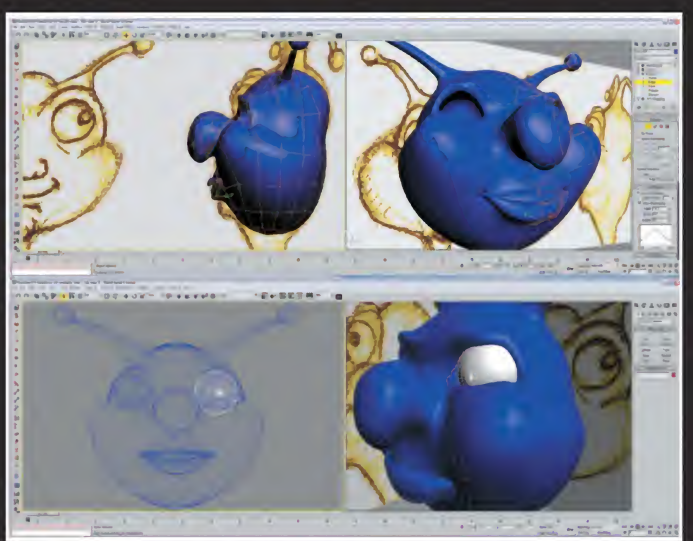


FIG.3 (A) FIG 4 (B): Mouth and eyeball creation.

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Repeat this a final time, but only select the inner-most polygons that form the smallest circle on the front of the eyeball.

Give these an ID=3. Coming out of sub-object mode should reveal that each channel material in the Multi/Sub-Object material has been applied to its respective ID position on the polygon surface.

Of course, an eyeball texture map could have been applied instead to the entire sphere, or you could choose not to have an iris. In the Front view rotate the eyeball a little to make it look directly forward. Under World co-ordinates, and with Use Transform Coordinate Centre selected from the fly-out on the Top Tool Bar, hit the Mirror tool button, choosing the x-axis and Copy from the options window that pops up. The two eyeballs should be looking forward.

To make the eyeball direction controller, go to the Top viewport and from the Create I Helpers TAB choose Point, checking both Cross and Box options. Click to create the Point helper some way directly in front of the left eye. Alter the Size parameter of the Point if necessary. Mirror this one or create another in front of the right eye. These can be lined up exactly in front of the respective pupils using the Transform Type In and/or the Align tool. They should be at the same height and distance in front of the eyeballs. Rename them (from Point01 and Point02) 'Eye Target Left' and 'Eye Target Right' respectively in the text entry box in the Command panel.

Next we create a Dummy object from the same Helpers menu directly between the two Point targets and at the same distance from the eyeballs. Align this to x=0.

Make it big enough to encompass the two smaller targets. Select the smaller targets and drag the Select and Link tool from them to the larger Dummy object and release to make this one the Parent of the other two. It could be renamed Eye Target Both.

Select the left eyeball, rename it Mesh Eyeball Left and choose the Motion TAB at the top of the Command panel. Open the Assign Controller by clicking the rollout bar, select the Rotation parameter on the list in the little window and click the Assign Controller button up and left from this window (it has an arrow on it). From the options box that pops up select LookAt Constraint.

Now, under the Motion TAB hit the Add LookAt Target button and select the Eye Target Left Point Helper object in the viewport. If the pupil flips around check the 'Keep Initial Offset box'. Repeat this process for the right eyeball, this time choosing the Eye Target Right as the LookAt Target object. Now whenever you move the Dummy object controller, Eye Target Both, the two Point object controllers move with it, and the eyeballs track (LookAt) them naturally. Cool, eh! To individually orient each eye just select and move either Point object, Eye Target Left/Right. As they are Children of the Dummy it will not move, and the other Point object will remain also.

Facial expressions

I will quickly go over a simple technique to introduce the concept of facial expression control, which can be used for still images and animation alike. We will again use Point Helper objects, but this time will connect them to various selected sub-object regions of the facial mesh at the Edit Mesh level via Linked XForm modifiers.

Note: Because the Symmetry modifier passes its affect right up to the top of the Stack, even if we place the Linked XForm mods and related Edit Mesh sub-object selections above it, the facial expression controls will only work symmetrically. This may not be a problem, but for advanced non-symmetric control the mesh object will need to be reduced to an Editable Mesh by right clicking below the MeshSmooth mod and choosing 'Collapse To'. All the mods below will be removed and an Editable Mesh remains, with the MeshSmooth still at the top of the Stack. From there, several Edit Mesh mods followed by Linked XForm mods will be layered on top of the Editable Mesh level. Each Edit Mesh sub-object selection region (cheeks, eyebrows, lips) will be left open so it will thus be controlled by the Linked XForm mod directly above it.

Firstly, create a Point Helper object in the Top viewport, naming it 'FaceControl Cheek Left' for controlling the movement of the cheek muscle region. Position it near the top of the left cheek (check this in various viewports) of the head mesh object. Set its size appropriately and check Cross, Box and Draw on Top in the Parameters I Display rollout.

Select the Mesh Head object (the head object – it's a good idea to logically name all items to ease selection in the Select by Name window). Select the Editable Mesh level of the Stack and add the first Edit Mesh mod, followed by the first Linked XForm mod. These can be renamed to keep track of what each one controls by right clicking them. In the Polygon level of this first Edit Mesh mod, select the main left cheek polygon. It can also be given a selection name in the Named Selection Sets drop-down menu/text entry box on the Top Tool Bar, which allows sub-objects or sets of whole items to be easily selected by the name of their set from this drop down menu.

With the cheek polygon still selected, go to the Linked XForm mod level and click the Pick Control Object button, then select the FaceControl Cheek Left, which is the Point Helper object from the viewport. The cheek region can now be controlled by moving (or even rotating or scaling) this assigned control object.

Adding further Edit Mesh and Linked XForm mods on top of this first one, selecting a different sub-object region/set each time at the relevant Edit Mesh level (this can be polygons, vertices, etc, and Soft Selection can also be applied) allows any region of the face to be controlled to set or even animate a range of expressions. FIG 5. shows the completed facial controllers.

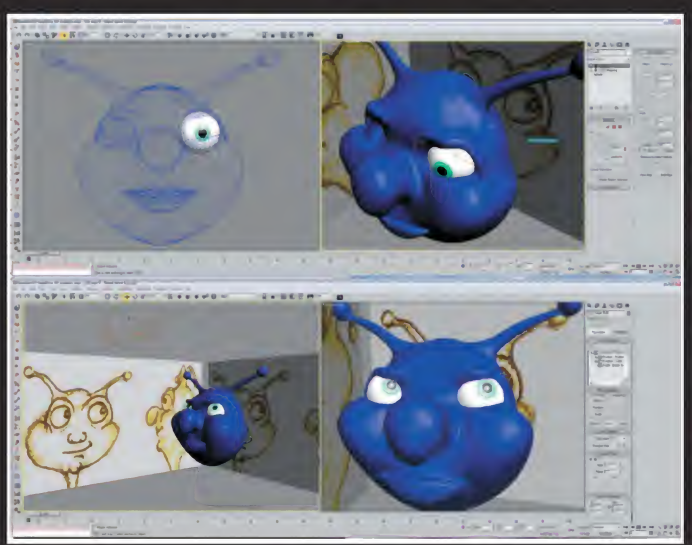

FIG.4 (B&C): Eyeball texture and eyeball targeting.

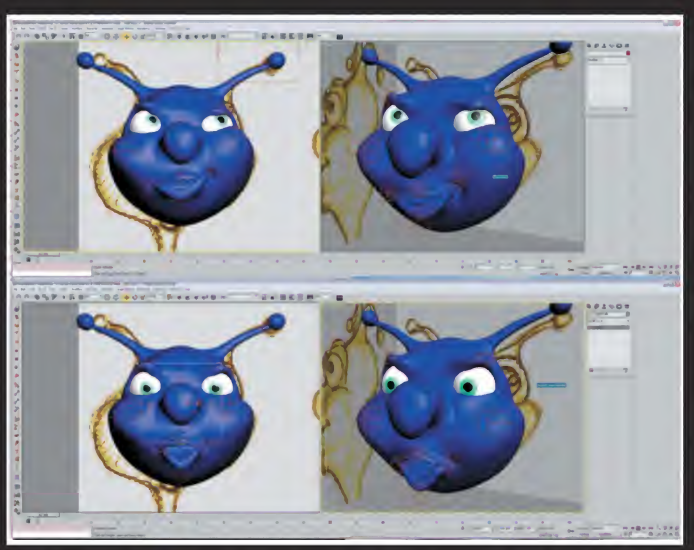

FIG.5 (A&B): When complete, you can construct various facial expressions.

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WINNABLES

GTA3: Vice City PS2 Pimpin' Pink Pack

The only thing that might have stopped you from playing GTA3: Vice City is the lack of a PS2. That, or you've been too busy decrypting the hidden CIA visual code that is broadcast in every episode of the superb piece of investigative journalism that is *Today Tonight*. For those of you without paranoid delusions or a PS2, Take2 has invited you to the contract killing, Hawaiian T-shirt wearing party that is Vice City. Thanks to the monstrous amount of money it made from this game over Christmas, Take2 probably didn't even realise just how valuable this schtonker of a prize is. As well as a PS2 console, the package includes a stack of different Vice City-themed products: a pillow, mirror, key-ring, money clip, Rubik's Cube and even the full seven-CD boxed soundtrack. Now that's one helluva lot of Vice City Gear.

Q: What would I be wearing if I was in a gunny sack and espadrilles?

Impossible Creatures

The world is full of impossible creatures. Russ Hinze springs to mind, as do Jerry Springer's guests, which makes us think of cane toads, too. Microsoft is obviously on the same wavelength as the cane toad, but instead of invading NSW, it is invading the PC gaming world. Microsoft's latest weapon in this war of fun is Impossible Creatures. We've reviewed the game in this issue. It's good. So good that we liked it. We liked it being so good, so much, that we want you to enjoy its goodness too. So does Microsoft, because we have five copies to give away. Tops!

Q: Which Australian winery was one of the sources of fruit fly breeding stock for worldwide genetic research?

Innovatek Set 5 AMD water cooling kit

Like radioactive toilet paper, intergalactic newspaper services and fusion-powered toothbrushes, H20 cooling is the way of the future. We took a look at two different kits this month, and the Innovatek case stood out as having the finest build quality you'll find. We thought we'd offer one of our lucky readers the chance to snap up one of these $500 kits free. Without the amazing generosity of the one stop cooling shop Cool PC (www.coolpc.com.au or (07) 3879 2255), we wouldn't have this fine example of German engineering to give away, so a hearty thank you to Cool PC.

Q: What atmospheric phenomena is attributable to the pooling of unusually cold water in the Equatorial Eastern Pacific ocean?

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Atomic 24 winners: Age of Mythology: Q. Who had his liver eaten every day and why? A. Prometheus. D. David, Yeronga QLD; B. Turner-Jones, Strathfieldsaye Vic; M. Moran, email; A. Koerber, Gawler East SA; M. Elliott, Liverpool NSW; K. Viola, Clayfield QLD; G. Gully, Keith 5267 SA; J. Yong, Donvale VIC; J. Cho, Bankstown NSW; C.Blackburn, Kuraby QLD. Jaron Deluxe Water Cooling Kit: Q. According to Arthur C. Clarke, where was off-limits to humans after the aliens turned Jupiter into a sun? A. Europa. P. Stevens, Ashgrove QLD. Seven-CD GTA Vice City soundtracks: Q. What was the name of the cave that was part of the swimming pool complex at Hugh Hefner's place? A. The Grotto. D. Novakovic, Drumcondra VIC; J. Freeman, Hamlyn Heights VIC; B. Sanderson, Broken Hill NSW; B. Keeys, Quirindi NSW; C. Stockwell, Yungaburra QLD; D.Kearney, Victoria Park WA; N. Campbell, Mooroolbark VIC. Linksys EtherFast Cable/DSL Router: Q. How many hours did Flash have to save the Earth, after Dale tells her that she loves him? A. 14 hours. G. Hudak, Mildura VIC.

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WRITE MODE ENABLED

There are more words in the English dictionary than Hobbits in The Shire. Incidentally, you can blatt a whole bunch of these together to make a sentence, and with luck, scribe a paragraph or two. If you send these to us, we'll put different ones here that relate to your ones. wOOt! IOOTM and POTM win the fully munty Logitech MX 500 mouse.

POTM: Atomican Zodiac traits

http://www.atomicmpc.com.au/forum.asp?cat=ge&top=78780&pg=20

It was a close call for POTM this round. The *Atomic* spirit shone shinily in Muntz's Bike Fund for Cisco, while Virtuoso's bath in Beijing had us all glued to the spot in fascinated horror. However, it must go to donnaGEM for her cleverly conceived and rightly-written astrological observations of Atomicans' stellar predisposition for forum personality expression.

Mostly right and highly entertaining, it is, rightly, a gem of a post.

Error, reporting in.

I know the whole OS of choice thing is not dissimilar to the religious fervour a good jihad can ignite, but I'd hoped *Atomic* wouldn't get involved. I'm hardly a Microsoft zealot, but I hope to bring balance.

I think it's admirable that you wish to report bugs in XP – but what about the other OSes out there? I didn't notice a message about the latest problems with KDE under Linux, which provides similar access to an attacker as the new XP bug. I'd understand if you were reporting on the most used OS out there, but that isn't XP. I understand your frustration that XP isn't cheap and yet is flawed, and that Microsoft has an attitude problem. But these are all emotional responses. Remember that saying about holding a hammer and everything looking like a nail?

Leon Buker

Red Arse's revenge

I have read Tim's 'Red Arse Fury' article and thought I would drop some thoughts. I think he is kind of missing the point with MMORPGs. Particularly with Everquest, which I confess to playing.

Tim seems to think that EQ (I will talk about EQ as I haven't played any others) should be just like any other PC game. Why?

The basis of EQ is that players win through co-operation, not by killing each other. This is unique in that you really can't do it with a normal PC game.

I'm sure some people will argue that the combat clans in a lot of combat LAN games are a form of co-operation, and they *are* in a very limited sense.

If everyone wandered around trying to be some sort of Uber Hero, EQ would not have worked. There are people who have become legendary; however they do it by their deeds and behaviour towards other players. Mostly in EQ, players are after some particular goal that they have decided on (another difference from a normal PC game, which usually sets your goals for you) and want other players to help them achieve it.

Starting off small and weak is also a good thing. Although I got the impression Tim didn't think so. Almost every PC game I can think of actually does this as well. However they tend to accelerate the process of becoming an Uber character and concentrate on throwing puzzles and masses of nastiness at you. This is something I usually find rather boring after a while as the games tend to get very linear and predicable.

In EQ the whole life of a character is about improving it, getting it better equipment, increasing skills, achieving quests etc. A lot of players in EQ even get their kicks from merely helping other players without recompense. Because the EQ world is so big, and it is not about beating one or two win scenarios, there is always something new for a player to do. In most other PC games, once you have finished the game – that's it, go buy the next expansion or edition.

As far as not being the biggest and meanest goes, there's nothing like having some higher level player step in to save your arse when you've bitten off more than you can chew or been jumped by half a dozen monsters – something that happens a lot.

I've regularly seen level 60 characters stop to help out a bunch of newbies who have gotten themselves in serious trouble, and then spend some time just watching over them for a while to make sure they are all right. I've yet to play a non-MMORPG where this sort of thing can happen.

Tim also gave the impression that PK-ing is a common thing. I can't talk for UO, but in EQ it is not possible. You cannot attack another player unless you issue a challenge and they accept it. Even if you do combat, the winner cannot loot the loser's corpse. For players who do want to get into this, EQ has some specific servers set aside fro PVP.

To summarise: the point of EQ is not PK-ing or being an Uber Knight with the coolest armour and weapons, it's about co-operation to achieve a greater goal, helping each other rather than hindering, and it has a very large online social aspect because of this.

Derek

Tim Dean replies: ***I actually agree with your points about Everquest – that it is more than just another multiplayer game, and that aspects like co-operation and high-level characters benevolently helping out new players make it more of a community.***

I don't necessarily think MMORPGs should change to be more like other games, and I have no problem with other people playing them – it's just they're not for me. Until Star Wars Galaxies, that is. . . ;)

Reverse spamology

Loved the LOTM for the *January issue*. That scam has been going on for so many years that it is good to see it being taken so seriously, although people still seem to get caught out by them.

A few months ago my mail server was totally clogged by this email. I had foolishly set up one of my accounts as a mail trap – to catch bad spellers mostly. These spammers had gotten a hold of my email domain and used one of those auto-address generation programs and sent me about 20,000 of their letters. This did piss me off – once I had managed to clear one lot another flooded in. It took three days before the emails stopped dribbling in. Since then I have turned off the mail trap setting (I know, I know others have already said it).

Now the real point behind this email.

The email I had received had a fax number. Out of curiosity I rang the number (from a payphone to fix the paranoia in me) and actually did get a fax number. This gave me an idea. Buy a cheap second-hand palm pilot with a modem unit and engage in some old fashioned phone phreaking. Set the palm up to autodial their fax number and send a fax through. Something polite on it of course. Once the fax ended the palm would autodial and send it again. If the line was engaged it would just keep trying. Never actually did it, but it placed a smile on my face thinking about it.

This idea can evolve. Some spam you get has a phone number – quite a few do, you know, 'Ring this number for a confidential consolation . . . blah blah.'

There is no way to stop spam, but there is a way to annoy them. Denial-of-service attacks on their sites are pointless as most are only temporary and it would affect other people that are innocent of spamming. Ring the number first to ensure it is for the actual spam, get a hold of the above mentioned palm pilot and flood the phone number. The only hitch in this wonderful plan is that most of them are US-based numbers and would get very expensive. So if there are any US-based readers please give it a try.

There is no way to stop these types of email scams or even spam, but maybe if we brought it back to the spammers and started flooding them with emails and phone calls they would slow down a bit. Currently there is a spam going around saying send $5 dollars to a list of five post office boxes for how to make money. It costs less than a dollar to send a letter overseas to these post office boxes. Everyone reading this; go out tomorrow and send a blank envelope with a short message in it, anything you want. The sender of these emails would then be the recipient of our spam and would have to open envelope after envelope in the hope of finding a $5 dollar note.

Its time to spam the spammers!

Blake

Lite Windows

I can't believe it, 2002 was a great year for *Atomic*. Lots of informative articles, lots of informative question and answers in the post and Let Us sections. Then it hits me like a slap in the face on a cold morning's day in January 2003. It seems a lot of your readers are dumb arses.

Example: this idiot James Battam, who writes in promoting Windows and suggests a Windows Lite version. Are you insane? He then goes on to say the way to get developers back to Windows in droves. Microsoft, and all its bullshit glory, has acquired world domination. There is a version of Windows in nearly every home around the non-third world civilisation on this Earth. And you're thinking of a good way to get developers back to Microsoft. Your nuts. 95% of development is done for Windows. And why? Because it's the number one OS being used around the world.

Harsh? Well if this kind of talk isn't nipped in the bud before it gets out of hand, then I will have to be on look out for another respectable PC mag.

I haven't finished yet. From his letter I hope this aforementioned idiot uses and loves MS Windows. Imagine if he got himself into a real OS. God help us all.

Vanne de Castle

While we refrain from calling readers 'idiots' or their opinions 'bullshit', we can somewhat understand you're opinion. However, sometimes having a stereotypical negative attitude towards hardware, software, or a corporation is not always the best thing to wield when writing comments on another letter. It is also not a great thing to judge a person by what OS they use – it is akin to judging someone by how they look.

It's true Windows is mainstream, but it wouldn't be if the OS didn't cut it.

Another point of interest: in a recent survey, it was found the more Linux systems were reported compromised than Windows 2000 systems. Both OSes have had their fair share of updates and revisions, so we're not sure what your definition of a 'real OS' is.

What James was saying was that he believed Microsoft would gain more support if it released a 'Lite' version of its Windows operating system. If you'd read the reply to James' letter, you would have seen that this could have been a reality – an extreme one, but quite possible.

If this had come to pass, it would have been a good thing. At the moment, the only requirement Microsoft had to meet was placing an uninstall feature for its middleware products into Windows XP SP 1 and Windows 2000 SP 3. Once these Service Packs are installed, you can remove programs such as Windows Messenger. Microsoft is also allowing world governments to view the source code to its Windows OS. NATO and Russia have already signed up for a peek.

Unfortunately, your hostile response doesn't compare well to James' well-thought out and intelligent letter. You should also back up your points.

Radioactive kitty

I was just wondering if you'd give me some advice. My cat's been acting strangely lately. Ever since he read your magazine, he's taken an unhealthy attachment to his computer. He started off playing with the mouse, but now he's got a piece of Perspex and he wants to use it on the computer with a jigsaw!

He's started muttering incoherently about 'antialiasing' and 'BIOS' or something. I don't know why he wants to make it faster? It's not going anywhere! He's always fiddling with wires and cables, jabbering numbers at me. I don't know what's got into him!

At the moment he's up a tree, howling at the moon, looking for satellites. At least it gives him a break from the computer – something about lag – but I'm worried it might be affecting him. What should I do?

You guys nearly make me want to be a techie again. But no, I got to be a rock hunter first. Maybe I'll be a techie as a hobby later on. Great mag all round and I've learnt heaps from reading it. Thanks.

I scored a couple of funny cartoons from the forums, so, I was wondering if there was an archive or somewhere I could get the whole set?

Colin Duff

Sorry to hear about your cat Colin. We hope he recovers – the first step will be getting him down from that tree and drilling holes again. At Atomic, we find cat food works a treat – but in his case, you should hunt for a RADEON 9700.

The sting of flashing

For some people, summer's a time to go to the beach, frolic in the park, or sit by the pool and wonder why England even bothered to show up for the cricket. For others, it's a time to draw the curtains, fire up their PCs, and trawl the Net for the latest drivers. Me, I'm one of those guys. And I have the phosphor tan to prove it.

My summer holidays consisted of me, my beige beauty, and a little word on countless Websites: support. I don't know how many times I clicked on that word, looking for the latest downloads. It's a cathartic experience, sitting in the dark and scouting list upon list of drivers and patches. Like Indiana Jones translating ancient texts, I was searching for the Holy Grail of performance.

One of my first updates was the dreaded BIOS flash. Not something to be taken lightly, the BIOS flash is the equivalent of removing someone's brain, jiggling a few bits around, and then stitching it back in and hoping it works. These days, flash software is pretty robust, so the risk (when compared to the old days) is fairly small.

But, as I discovered, there *is* still a risk.

After double-checking I had the right BIOS (trust me – you should always double check), I booted from the floppy and ran the flash utility. I had to laugh when the screen said 'Are you sure you want to flash the BIOS?' Well, no – I'm only doing this to marvel at the lovely interface. Of *course* I want to flash the BIOS! It's like a waiter asking if you want to eat, or if you've come to the restaurant just to watch the lobster tank.

Anyway, I accepted the challenge and pressed 'Enter', watching the graphic slowly advance. . . then pause (gasp!). . . then continue. Finally it gave the all clear (sweet relief!) and I did a reboot.

You know the feeling you get when your nephew makes paper aeroplanes from your mint copy of *Atomic #1*?

Or when your sister catches you trying to stuff him down the rubbish chute?

I got that feeling when my machine rebooted. All the pre-check stuff came up, but then the screen blanked. . . followed by a single blinking cursor.

Nothing else.

Just two horizontal lines, doing bugger all.

I decided to wait.

After all, this was a very complex piece of machinery. Surely there were a bunch of calculations it had to do before starting the hard drives. Seconds slipped to minutes. Minutes slipped to despair. I had no idea what I'd done wrong, and no way to fix it. No wonder the flash utility had questioned my skill. . . it knew I wasn't an uber geek.

You see, at this point the uber geek would have known just what to do. Configure the BIOS, rewire the arrays, whatever it took.

And at this point I realised I wasn't an uber geek. Sure, I'd always kidded myself I knew my way around an OS, and that I could build a PC that would shake the very foundations of Moore's Law. But it took just one keystroke to bring that illusion crashing down. I was as uber as a newbie at a LANfest.

Suffice to say, it took me a week of research, a box of floppies and a little word called 'RAID' to reconfigure my BIOS (don't laugh. . . well okay, maybe a little).

But given the choice, would I attempt a BIOS flash again?

You bet.

Why? Well, there's an old fable that sums it up nicely, about a scorpion and a fox:

'A scorpion wants to cross a river, and asks a fox for a ride. The fox says: "Why should I help you? You'll probably sting me and sell my pelt on the black market."

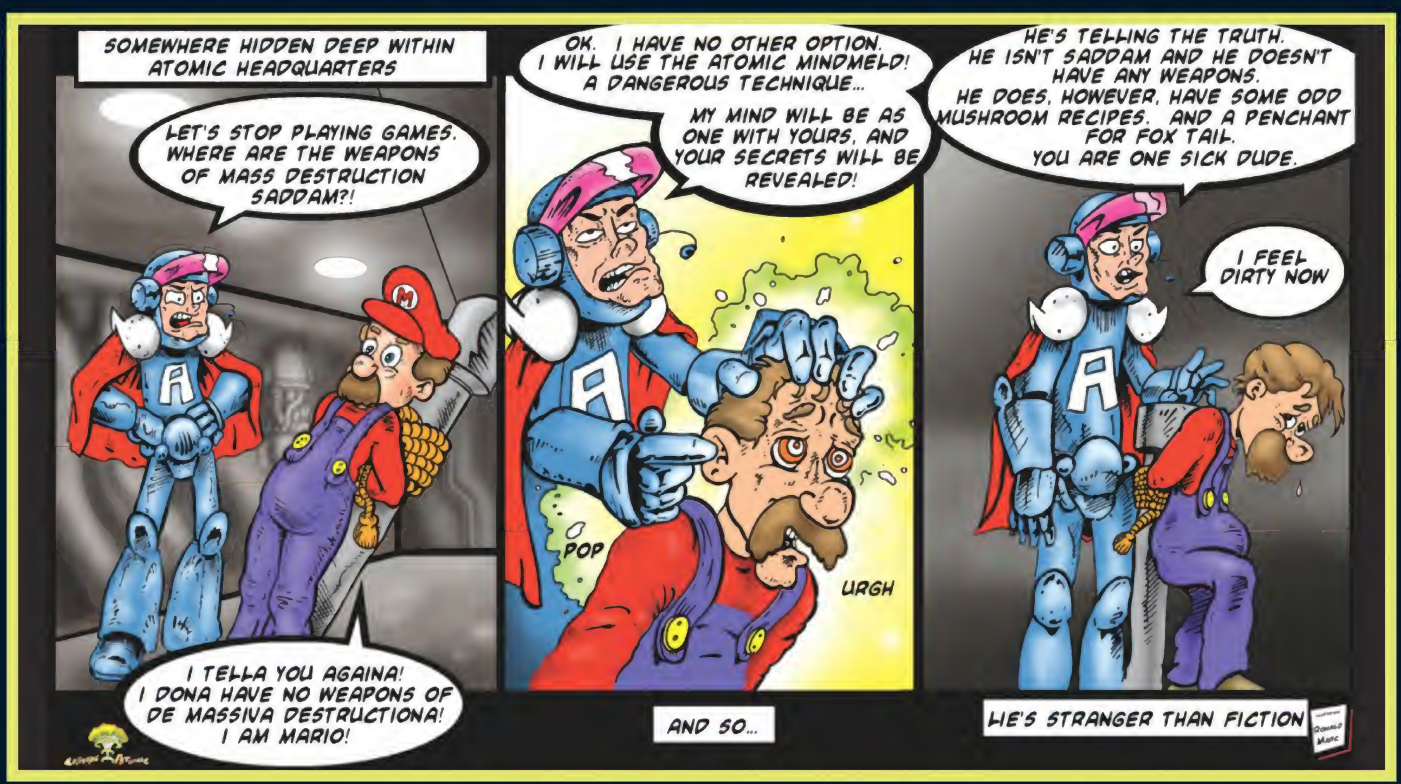
'The scorpion convinces him otherwise, and they both set off.

'Halfway across, the scorpion gets bored and stings the fox. As the fox sinks, he asks how the scorpion could be so stupid. "It's in my nature," the scorpion replies.'

And just like that scorpion, the nature of the Atomican is to strive to own the best, most powerful hot box he or she can have. Even it means a week of teeth gnashing and worn 'Ctrl-Alt-Delete' keys.

The moral of this story? Unless you're good at riding foxes, you should try your hand at flashing.

John Simpson



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